MODERN Machine Shop

HOWARD CAMPBELL, Editor

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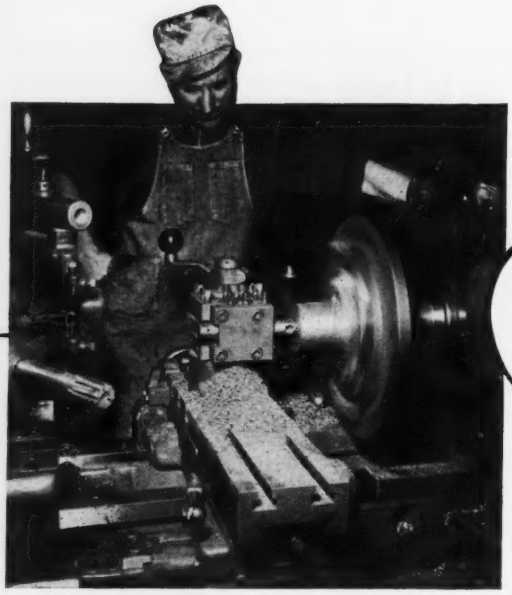

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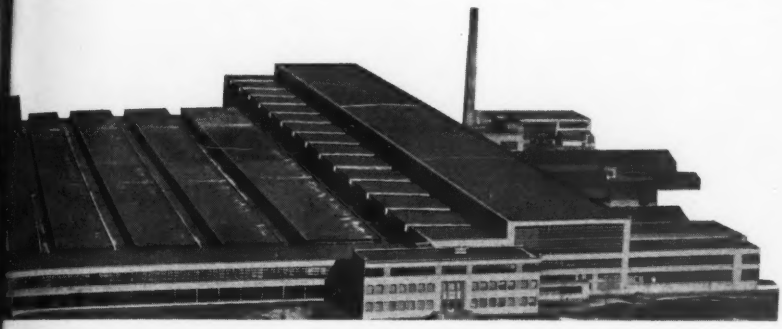
JONES & LAMSON MACHINE

MODERN
Machine Shop

CINCINNATI, OHIO

, 1939 VOL. 11, NO. 12



Building the Diesel-Electric Locomotive

his article comprises, in effect, a trip through the new plant of the Electro-Motive Corporation at LaGrange, Ill.

By HOWARD CAMPBELL
Editor, MODERN MACHINE SHOP

ROGRESS — in all that the term means when applied to the present —is nowhere better symbolized than the modern Diesel-electric locomo-ve. Designed to obtain the high-possible operating efficiency from e combination of a Diesel oil en-ne and and electric generator, the chanism is housed in a "stream-lined" jacket that veils every detail of engineering apparatus. Instead of the dead black which has been the standard coating for steam locomotives, the new engines are attractively decorated with bright plating and gay colors as though to announce to the world that railroad transportation has entered a new era.

Fig. 1—The six pads upon which the generator and engine are to be mounted are mill with this Hoess portable milling machine.

And so it has. In 1931 trains on American railroads operating on a regular schedule of 60 miles per hour or better covered 1,100 miles a day. Today trains operating on a 60-mile an hour schedule travel more than 40,000 miles a day. The railroads have been quick to adopt the new type of engine, creating a demand which has forced the development of an entirely new technique in locomotive construction.

The largest plant in the United States devoted exclusively to the building of Diesel-electric locomotives is the new plant of the Electro-Motive Corporation at LaGrange, Ill.

one complete locomotive per day.

The framework of the building is of all-welded steel and the walls and roof are of almost continuous glass, giving the huge plant practically the equivalent of daylight conditions. A long north-and-south bay on the west side of the plant houses the receiving and material warehouse departments. A train of fourteen 90-foot freight cars can be set on a spur track extending the length of this bay.

The corresponding bay on the east side of the building houses the engine assembly department, engine test and transmission test

There are seventeen transverse bays between the two long outer bays which constitute the main manufacturing area, each bay being 48 ft. in width and equipped with overhead cranes of from 5 to 15 tons capacity. These large bays permit the use of straight-line production methods.

In the building of a Diesel-electric locomotive, the Diesel engine and generator are mounted on a steel

Fig. 2—Welding four 2 x 7-in. steel sills to the underframe. The welding machine is carried on the lower end of a vertical shaft which is suspended from the carriage of a Gantry crane; thus movement in three planes can be obtained.

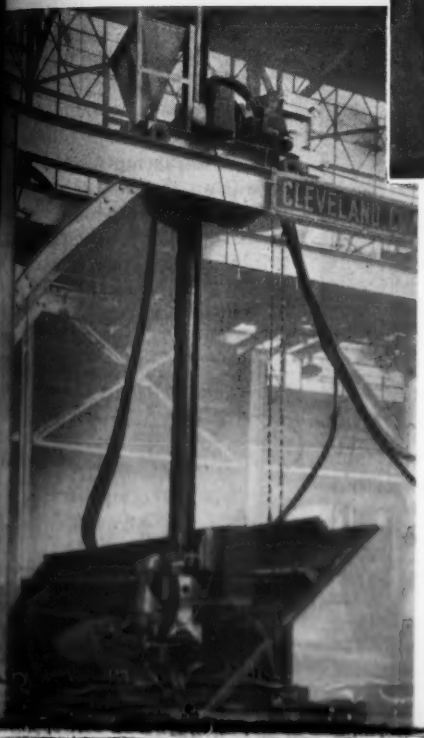


Fig. 3—Close view of welding operation showing flow of pulverized slag over point of contact to prevent oxidation of the weld.

frame or base which also serves as the bottom cover plate. The generator and engine are mounted on six pads that are welded to the cover plate. In order to provide a flat, even foundation, the pads are milled, the machining operation being performed with the Hoess portable universal milling machine shown in operation in Fig. 1.

The machine travels on two rails, placed parallel, one each side of the engine base so that the cross rail of the miller straddles the base. With the rails in position and the machine properly set up for the

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MODERN Machine Shop

HOWARD CAMPBELL, Editor

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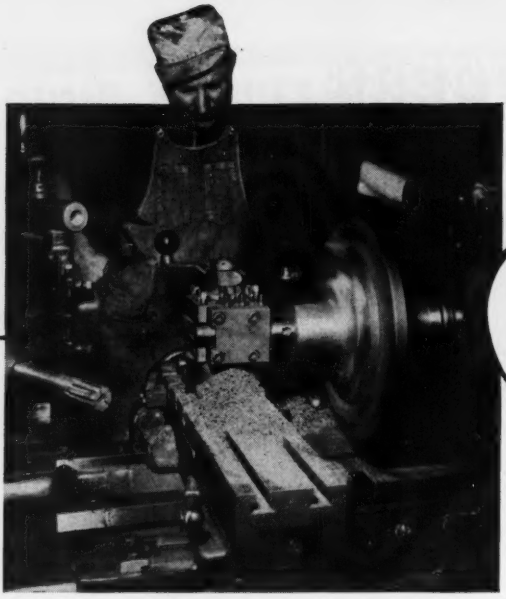

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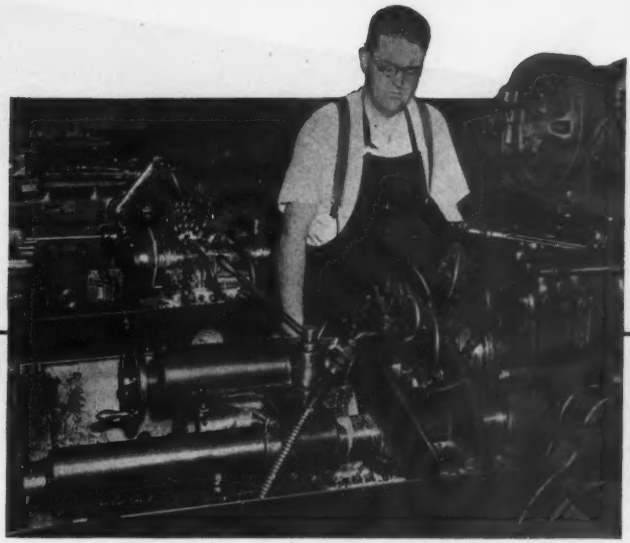
JONES & LAMSON MACHINE

J&L

IN THE Gear DEPARTMENT



THE FAY MAKES PROFITS ON SMALL LOTS

IN the gear department of the average plant it is always difficult to make a profit on small lots. The J&L Fay Automatic Lathe is designed for quick set-up changes—this, together with speed, power, rigidity and simplified operation, has spelled the difference between profit and loss in many plants.

The two 12" Fays, shown above, are turning headstock gear blanks. One machine is used for roughing and the other for finishing. A variety of gear blanks, in lots of 50 pieces, are turned profitably on these machines. Accurate blanks are obtained because they are mounted on an arbor and held between centers for finish turning and facing on the Fay. One operator cares for both machines, the usual arrangement for this type of work.

Interesting production reports on gear blank work are yours for the asking. They will show how the Fay can produce profitably in your own gear department.

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● Rough and finish grinding simultaneously the .7490″ and 1.1895″ diameters on steering knuckles, this 10″ x 18″ Plain Hydraulic finishes each piece in .33 minute. It grinds to these limits: size—.0005″; straight—.0001″; roundness—.0001″.

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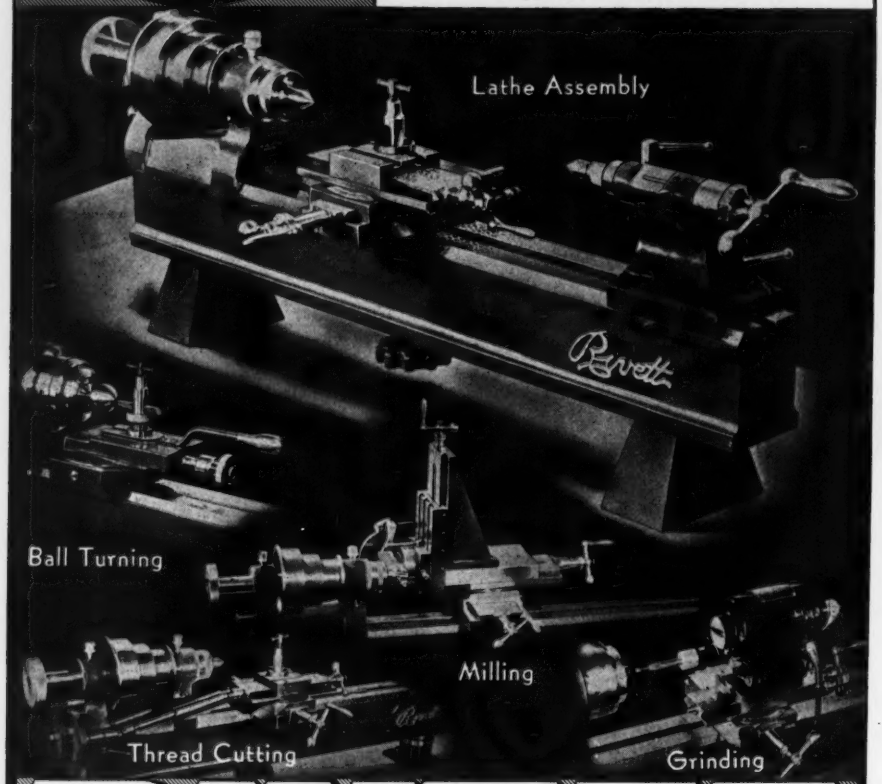

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Checks Spur or Helical Tooth Involutes of any size gear within machine's capacity.

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Setting for any desired gear size made with your standard gauge blocks; no extra base rolls or parts to buy.

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USING A 4-SPINDLE drilling set-up, drilling nickel-iron containing 40-50% nickel, the best production per set of eight drills was 2800 pieces.

Switching cutting oils, the life of eight drills shot up to 4900 pieces.

The oil that brought this 75% increase in drill life was Texaco Sultex Cutting Oil.

Tapping this same ferro-nickel piece in a Haskins No. 2 High Speed Tapping Machine, output per tap held to 2400 pieces.

Again, switching from the cutting fluid they thought best, output per tap immediately went up to 6000 pieces.

The oil that gave this 150% increase was Texaco Sultex Cutting Oil.

To get your machining operations on a more efficient basis, get in touch with Texaco. Trained engineers are available to help you select and apply any of 350 Texaco Products. To order, phone the nearest of 2229 Texaco warehouses or write:

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TEXACO

TAPPING BLIND HOLES in this thin-wall nickel-iron requires quality in the tapping machine, the tap and in the cutting fluid. This Haskins No. 2 High Speed Tapping Machine increased tap life 150% when used with Texaco Sultex Cutting Oil.

Texaco Dealers invite you to tune in The Texaco Star Theatre—a full hour of all-star entertainment—Every Wednesday Night—Columbia Network —9:00 E.D.T.; 8:00 E.S.T.; 8:00 C.D.T.; 7:00 C.S.T.; 6:00 M.S.T.; 5:00 P.S.T.

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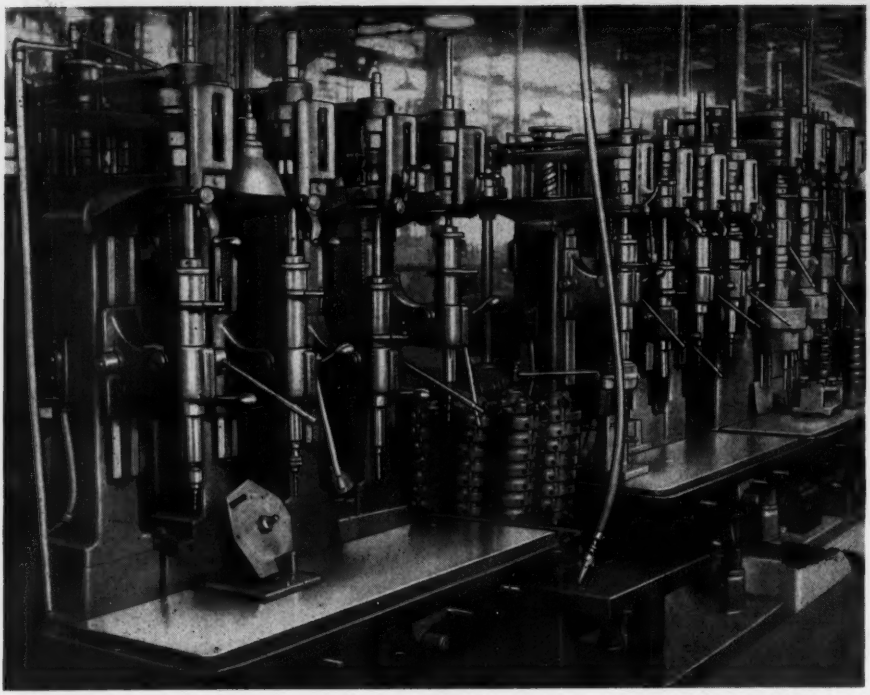
FOSDICK SENSITIVE DRILLS

This Battery *Electrifies* Production



The illustration above is a partial view of a battery of 100 FOSDICK Sensitive Drills used by a large refrigerator manufacturer to SPEED UP accurate production work.

The drills are No. 4 High Speed Ball Bearing — with multiple splined spindles and spiral gear drives.

Write for catalog MSS which describes complete line of FOSDICK Sensitive Drills.

FOSDICK also manufactures Radial Drills, Jig Borers and Uprights.

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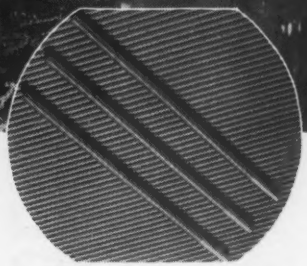

★ These screws of cold rolled bar stock are threaded a distance of 19/64", cut off, chamfered, knurled at one end and a number 0 hole is drilled ¼" deep. The two operations require 1 minute and 40 seconds and 1 minute and 30 seconds respectively.

COMES 47% OF MACHINING COSTS

The 47% saving was made on a new Gisholt No. 4 Universal Turret Lathe equipped with the Gisholt speed selector. This is a great time saver because while one cut is in progress, the operator can select and pre-set the spindle speed for the next cut. The pre-set speed is then obtained by touching a trip and the machine automatically makes the shift. There is no loss of time.

The "pre-setting" of spindle speeds is only one of the three ways in which the Gisholt "Speed Selector" can be used. *For full information, ask a Gisholt field engineer or write us.*

Gisholt "Speed Selector"

The most efficient control ever devised for the purpose. Operator sets dial to diameter of the cut and the machine automatically responds with the most efficient cutting speed, whether it's for turning, facing and boring. A touch of the high-low trip immediately provides proper reaming or threading speed. Available on Gisholt Nos. 3, 4, and 5 Ram Type Universal Turret Lathe. Literature will be sent on request.

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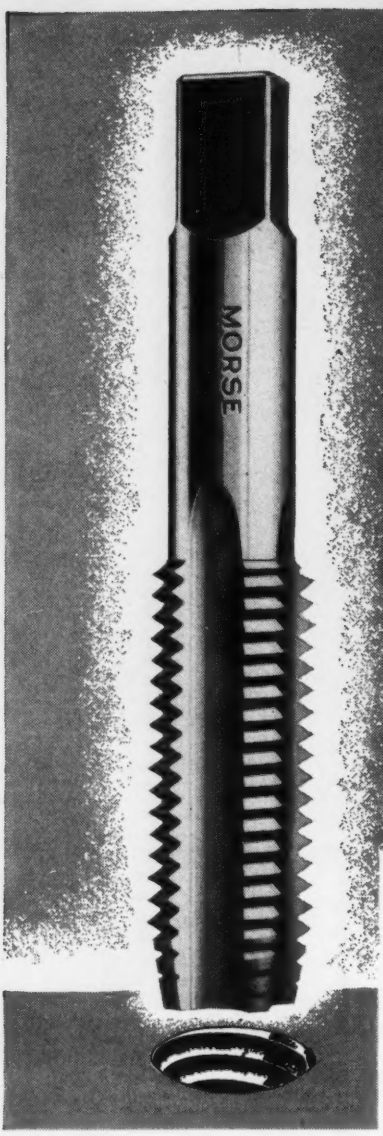

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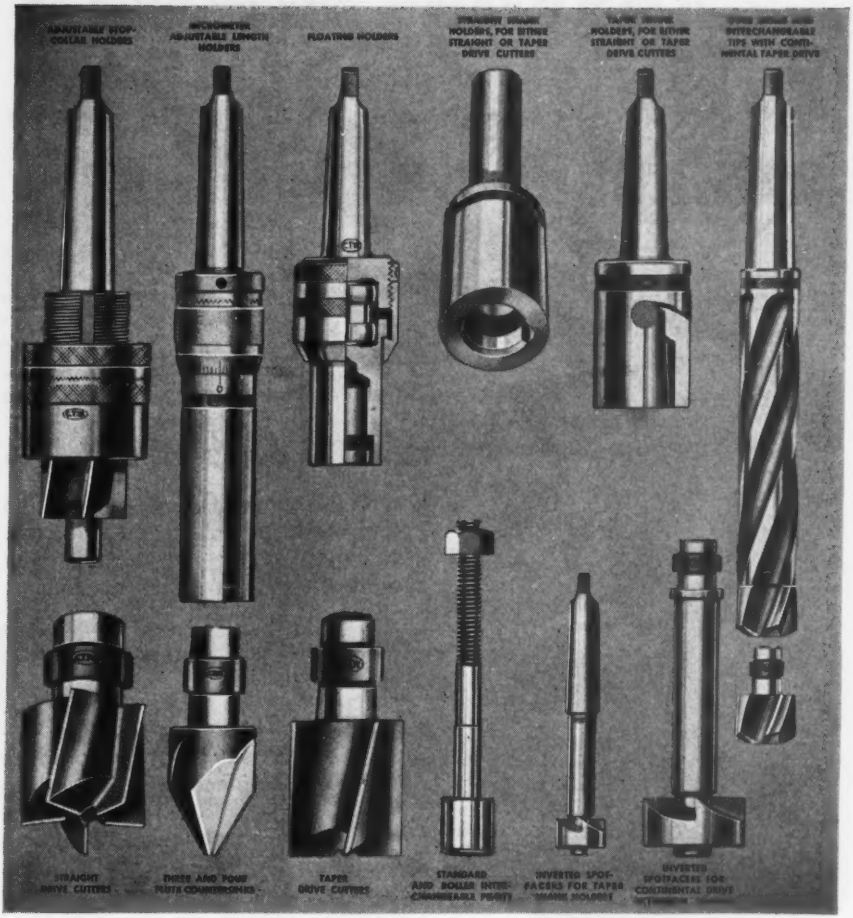
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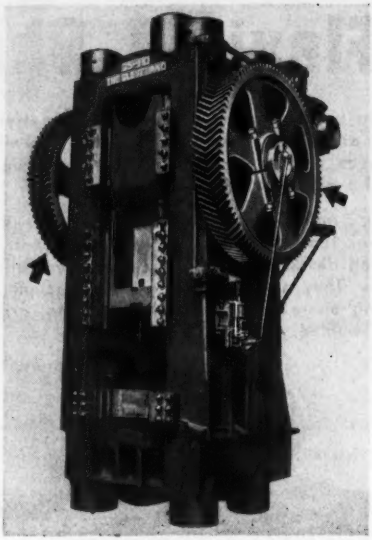
As a result of these and other advantages inherent in Farrel - Sykes gears, they can be depended upon for efficient, economical performance and long life under severe operating conditions.



Farrel-Sykes continuous tooth herringbone gears provide a smooth, quiet, efficient drive for these heavy duty forging-sizing presses built by the Cleveland Punch & Shear Works Company.

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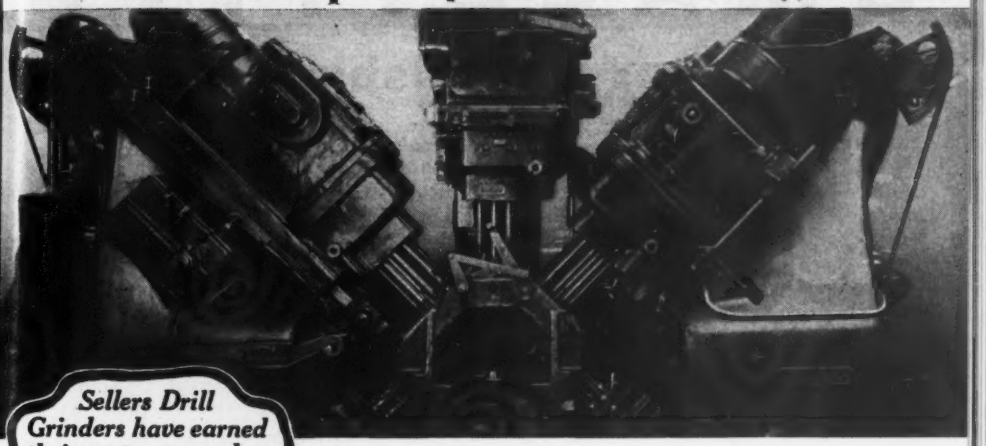

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Sellers Drill Grinders are particularly suited for grinding units of drills to equal lengths — and the operation is so simple your tool room attendant can easily do the job.

Write today for information on how you can lower drilling costs in your plant.

Send us six or more of your drills to be ground on a Sellers Grinder . . . Try them on your own work . . . Compare drilling speeds, quality of holes, number of holes per grind.

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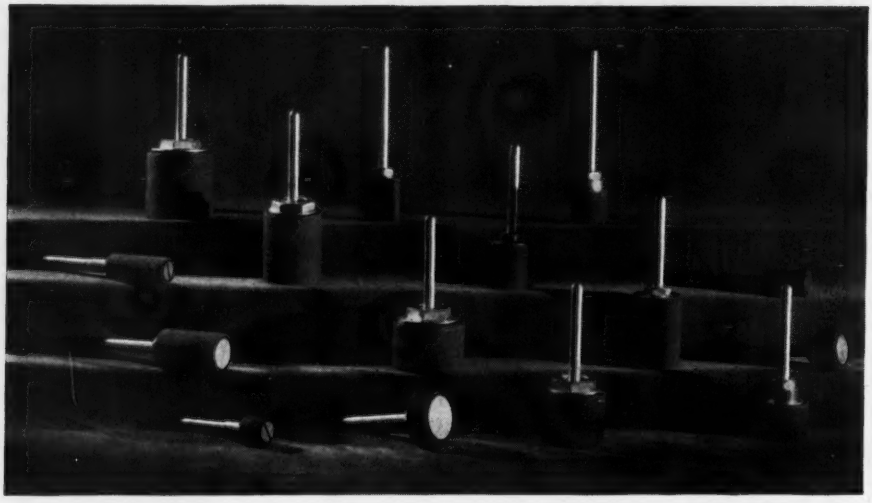
These drums are available with 3/16" and 1/4" shanks. There are no protruding nuts or screws, permitting work in close corners.

Write for our new circular S-457 describing these drums, and the price list on our new lapless abrasive belts.



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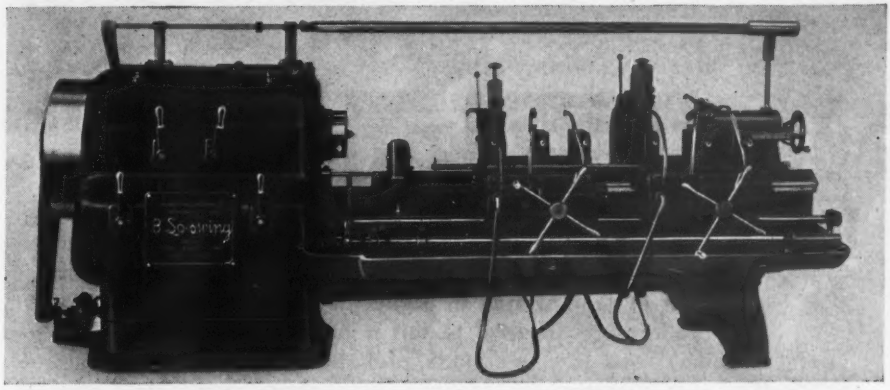
KELLERFLEX SALES DEPT.

MACHINE OF THE MONTH

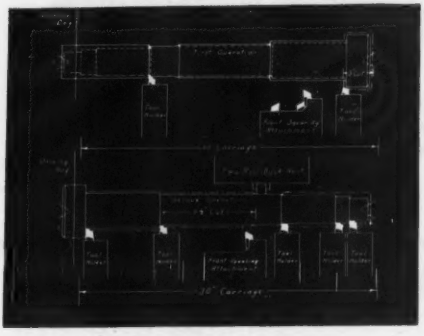
PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



TURNING COSTS REDUCED ON SMALL LOTS OF HEAVY SPINDLES BY MULTIPLE TOOL SET-UP ON 8" LO-SWING LATHE

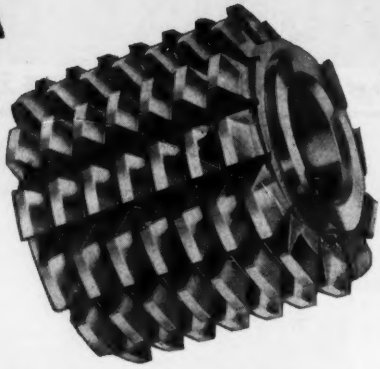
● *Problem*: To reduce the cost of turning heavy spindles in small and medium lots.

Solution: An 8" Lo-swing Lathe was selected, because it had plenty of power to take heavy multiple cuts and offered a method of quick set-up with multiple tools, thus minimizing the time required in changing over from job to job.



The tooling layout shows a typical spindle which is completely rough turned in two operations on the 8" Lo-swing Lathe, illustrated above. Machining time for the first operation was 11.2 minutes. Machining time for the second operation was 10.25 minutes. Set-up time required to prepare the machine for this particular job was 30 minutes.

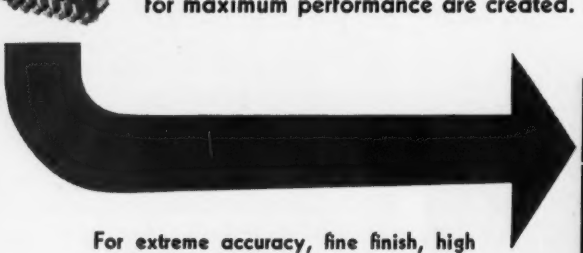
HOBS



Barber-Colman Hobs, standard or special, with ground or unground tooth-forms, are unexcelled.

Pioneers in the field, Barber-Colman engineers developed special machines and methods for effective production of hobs in general, and in particular for hobs having ground tooth-forms. Added to this is broad experience through the years in a multitude of hobbing problems, together with extensive use of hobs for commercial manufacturing in other departments of our plant.

Barber-Colman Ground Hobs meet completely the demand for extreme accuracy. Tooth forms are precise within close limits, can be duplicated exactly. Devitalized skin and minute inaccuracies induced by hardening are removed, keen cutting edges of metal in prime condition for maximum performance are created.



BARBER B-C COLMAN PRODUCTS

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

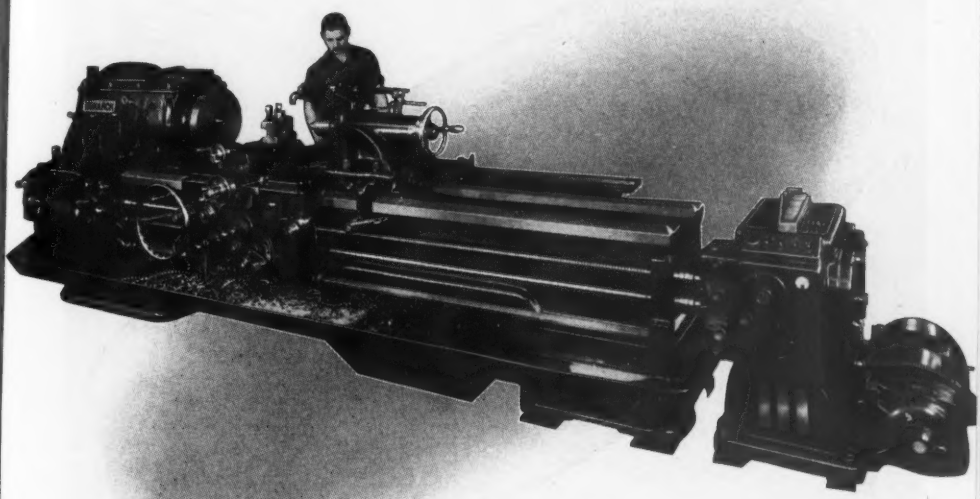
For extreme accuracy, fine finish, high production, durability, and value . . . Buy B-C Ground Hobs. For ordinary commercial limits, low purchase price . . . Buy B-C unground Hobs.

BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U.S.A.

TWO LATHES IN ONE...

When You Use MONARCH AUTOMATIC SIZING



TO operate a Monarch engine or tool-room lathe as a flexible unit on many types of jobs — or, as an AUTOMATIC machine which *accurately duplicates* parts (whether run in small or large lots) — that's what AUTOMATIC SIZING makes possible.

This new Monarch development makes an automatic machine out of the Monarch lathe. The change from *manual* to *automatic* operation takes less than a minute. After the "set-up", the operator merely loads and unloads—and may easily operate two or more units at the same time. With AUTOMATIC SIZING, you can reduce your costs on a wide variety of work such as step shaft turning, step boring, step facing, contour turning, or, on any combination of these. Let us prove this statement to you.

MONARCH LATHES cover the turning field and include:

ENGINE LATHES
LATHES
MONARCH KELLER LATHES
X-T MANUFACTURING LATHES
10" SENSITIVE PRECISION LATHES
MODEL "C" TOOL ROOM LATHES

Write for Catalogs

MONARCH LATHES
SIDNEY... OHIO, U.S.A.

THE MONARCH MACHINE TOOL CO., Sidney, Ohio, U. S. A.

Chicago Sales Office: 622 West Washington Boulevard • Indianapolis Sales Office: 3115 North Meridian Street. • Newark Sales Office: 1060 Broad Street • Pittsburgh Sales Office: 604 Chamber of Commerce Building.
Agencies in principal industrial centers of this and foreign countries.

MAKE MORE GOODS FOR MORE PEOPLE AT FAR LESS COS

LANDIS

Entrusting them to **LANDIS** *whether*

STRAIGHT OR ANGULAR

Many of the leading manufacturers of radial aircraft engines the world over grind their cams on Landis equipment. . . . Recently design changes have brought into use an angular type of cam. It takes the place of the conventional straight cam. Landis equipment is handling these angular cams just as efficiently as it has for years handled the straight cams. . . . The same machine with very minor changes may be used for both operations. Could you profit by this versatility?

LANDIS TOOL CO.
WAYNESBORO, PA.

AS *Quick* AS YOU CAN SAY, "STARRETT HACKSAWS"

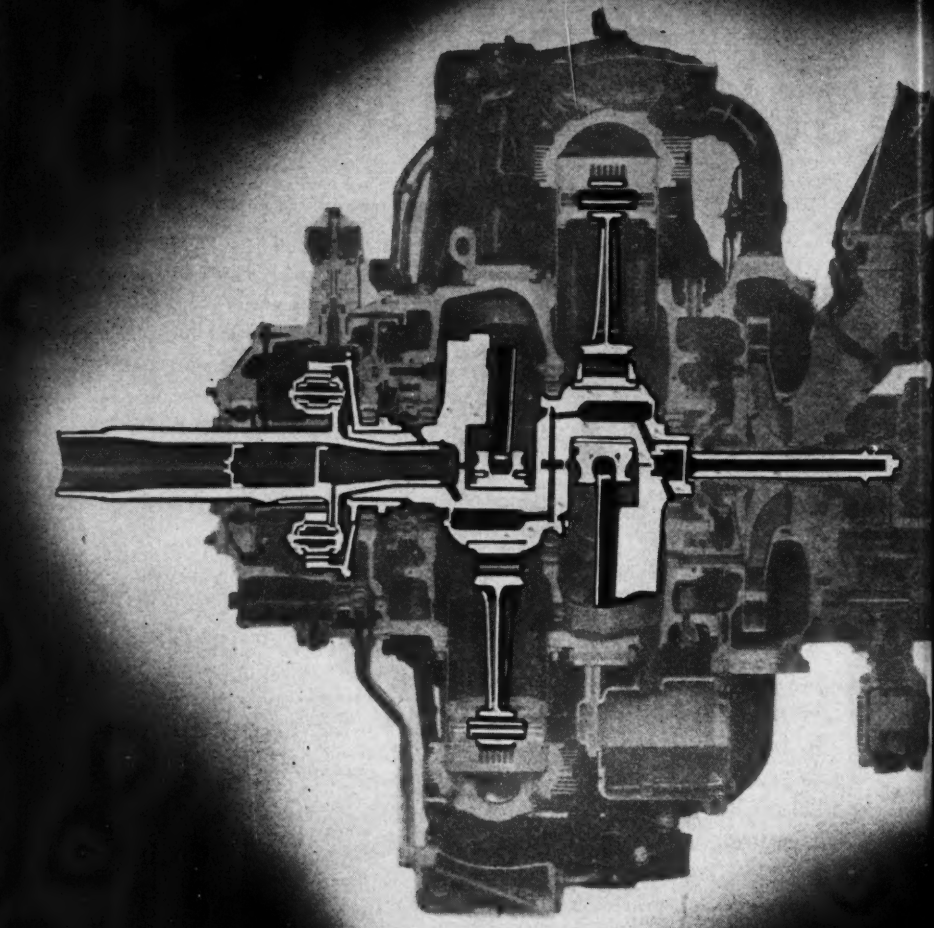
If it's more and faster cuts you want, get them with Starrett Hacksaws. The *complete* line of Starrett S-M Molybdenum, High Speed Steel and Tungsten Alloy Hacksaws includes the one best blade for any metal cutting job.

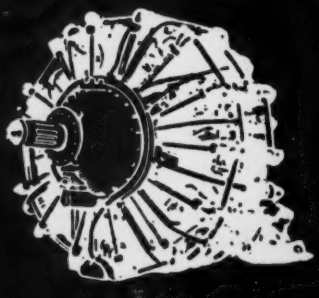
FOR BETTER CUTTING, pick the correct hacksaw blade from the complete line listed in the Starrett Catalog. Starrett Hacksaws are readily available through your regular distributor. Write for Starrett Catalog No. 26-MD

THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.

World's Greatest Toolmakers — Manufacturers of Hacksaws Unexcelled — Steel Tapes, Standard for Accuracy — Dial Indicators for Every Requirement

Standardize on
STARRETT TOOLS
BUY THROUGH YOUR DISTRIBUTOR





CRUCIBLE STEEL CHATS

Crucible ALLOY *Steels*

. . . For Utmost Dependability

Aviation engineers insist on dependable, uniform steels for aircraft engines where safety, speed and profits depend upon faultless operation. That is why Crucible's Electric Furnace Aircraft Quality Alloy Steels are so widely used for vital engine parts by leading aircraft engine manufacturers.

Not alone in aviation, but in all industry . . . wherever Quality Steels are specified . . . you will find Crucible associated with the development and application of these finer steels. For Crucible produces more dependable, uniform steels, made by craftsmen in small furnaces at Tool Steel Mills, where exacting metallurgical safeguards are relentlessly enforced.

Crucible offers complete Steel Service to industry at 26 Branches and Warehouses . . . from Coast-to-Coast . . . where experienced steel men who talk your language are always ready to consult with you. Here, diversified stocks of Crucible's Quality Steels are always on hand for immediate delivery.

We will welcome your inquiry. Get in touch with our nearest Crucible Steel representative. His suggestions . . . based on experience . . . may occasion better applications . . . increase your production and profits . . . improve your products. "The Specialty Steelsmiths to Industry" are as close to you as your telephone. Call Crucible!

CRUCIBLE STEEL COMPANY of America

Specialty Steelsmiths to INDUSTRY

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BRANCHES, WAREHOUSES AND DISTRIBUTORS IN PRINCIPAL CITIES

CONSULT TELEPHONE DIRECTORY OR THOMAS' REGISTER FOR NEAREST OFFICE

MAKERS OF HIGH SPEED, TOOL, STAINLESS, ALLOY, PRODUCTION AND SPECIAL PURPOSE STEELS

It looks like $250.00

It Costs only

$107.50

FIRST-CLASS 14" METAL-CUTTING BAND SAW TO HANDLE LIGHT WORK AT LOWEST COST

Look over this 14" Metal Cutting Band Saw . . . see what a fine, dependable machine you get for so little money. You'll agree that there's no need for any plant to get along without a light saw . . . no need to pay the high costs of running a big saw on light work.

Eight speeds make this saw useful for many jobs. It will cut metal bars, shapes and sheets or plastic, fibre, etc. In a moment it can be set to drive direct for woodworking.

It is ideal for a general machine shop, toolroom, foundry, experimental and maintenance work, as well as for regular production operations.

Send for Catalog which gives full details about the tilting table mechanism, dust sealed bearings, safety features, etc., etc. Better, see the saw and other Walker-Turner tools at your local Walker-Turner dealers. Walker-Turner Co., Inc., 759 Berckman St., Plainfield, N. J.

WALKER-TURNER

Light Machines for Industry

Drill Presses, Bench Saws, Band Saws, Jig Saws, Flexible Shafts, Jointers, Shapers, Bench Grinders, Lathes, Surfacers.

.... *Two New*
Centrifugal Motorpumps

Compact — Modern — Flexible in Installation —

for Supplying Coolant
or for light transfer work

Can be mounted either horizontally or vertically.

Motors are fully enclosed with permanently sealed ball bearings for dependability and long service.

— No. 240 has flange mounting integral with pump - - - - eliminating inlet piping.

— A Complete Line of Pumps

— Geared — Vane — Centrifugal — including Motorpumps —

for — Circulating Liquids
— Forced Feed Lubrication
— Maintaining Pressure
— Supplying Coolant
— Hydraulic Systems

Write for Pump Catalog.

Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

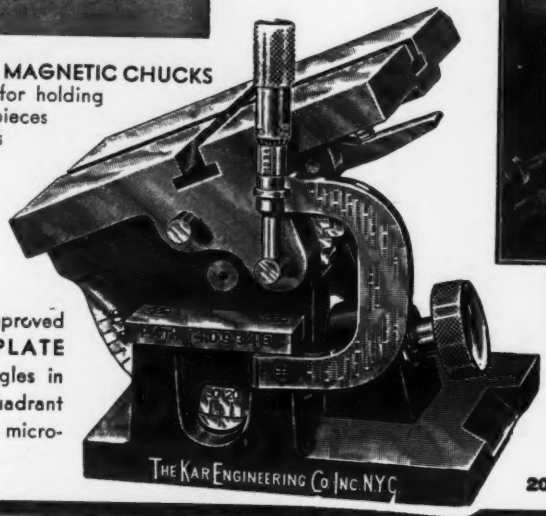
BROWN & SHARPE

KAR TIME SAVING DEVICES

Increase PRODUCTION *decrease* COST

ACCESSORIES for MAGNETIC CHUCKS
Karnetic Parallels for holding irregular shaped pieces without special jigs and fixtures.

WRITE FOR LITERATURE



The new and improved **SINE ANGLE PLATE** measures exact angles in any part of the quadrant —only a two inch micrometer is necessary.

DEMAGNETIZE on the same chuck that held the work during a machine operation. No separate demagnetizer is necessary. A new and patented feature found only in **THE KAR DUO MAGNETIC CHUCK.**

ESTABLISHED 1916

The KAR Engineering Co., Inc.
200 HUDSON STREET **NEW YORK CITY**

THE NEW LeBLOND SUPER REGAL LATHES 13", 15", 17" and 19"

LeBLOND LATHES HELP MAINTAIN STATE CAPITOL

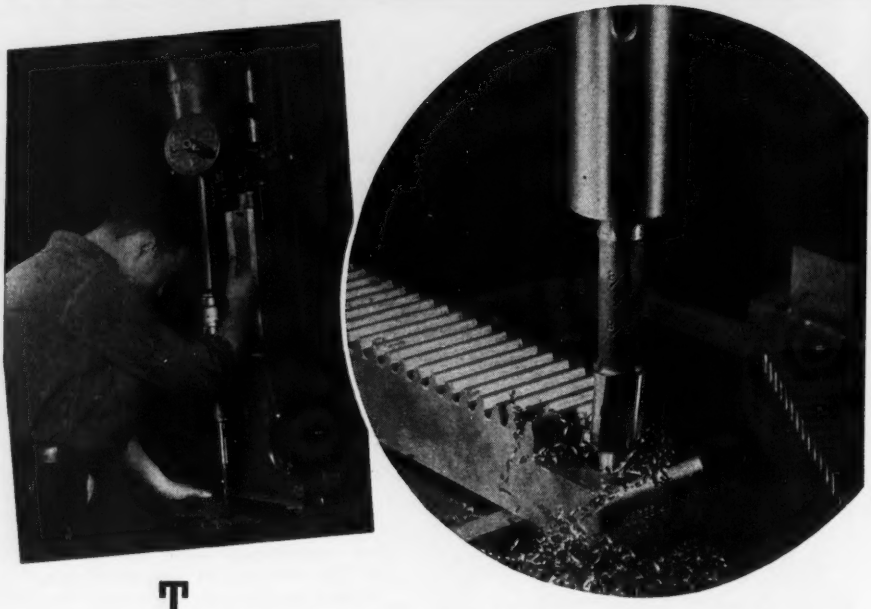
An interesting installation recently made is the LeBlond 12", 16-spindle speed Regal in the State Capitol Building at Sacramento, California. This precision lathe is used for all types of turning and machining jobs—required in the maintenance of this beautiful structure.

New—redesigned—vastly improved—heavier construction throughout—increased swing—sturdier bed with exceptionally heavy ways. Furnished with either plain or anti-friction bearings . . . Speed selector now built into headstock with dial to show cutting speed for commonly machined materials—to indicate R. P. M. for proper cutting speed—to show lever settings to deliver indicated speed . . . These new features plus Regal's well known safety, accuracy, simplicity and performance, will be welcome news to Regal enthusiasts.

For detailed data on the new Super Regals Address Dept. N-14

LeBLOND
CINCINNATI, OHIO
U.S.A.

for tool, die and tough steel parts



THE No. 2 Footburt Sipp Type Drill with back gear is a "Full Range Drill" designed to handle those counterboring and spotfacing operations that burn up tools when used on high speed drilling machines. Speeds down to 185 R. P. M., without loss of power, make this machine the right machine for toolroom work.

Write for Latest Circulars

THE FOOTE-BURT COMPANY
CLEVELAND, OHIO
Detroit Office: 4-151 General Motors Building

FOOTBURT SIPP SENSITIVE DRILLS

You wouldn't set up screws this way

BUT *THESE* SOCKET SCREWS* HAVE THE TORQUE STRENGTH TO STAND SUCH LOADS!

TORQUE TESTS - - In Parker-Kalon's Laboratory - - make certain that Parker-Kalon Cold-forged Socket Screws can be set up TIGHTER without twisting off the heads. *For instance, a 1/2"-20 (N.F.) Cap Screw must take a 2200 inch pound minimum load.

"16 POINT QUALITY-CONTROL" Leads Critical Buyers to Demand PARKER-KALON

This torsion test is only one of 16 check-ups on important characteristics of Parker-Kalon Cold-forged Socket Screws. In a laboratory without counterpart in the industry, quality is guarded by thorough tests and inspections covering:

1 — Chemical Analysis. 2 — Tensile Strength. 3—Ductility. 4—Torsional Strength. 5—Ability to take Shock Loads under Tension. 6—Resistance to Shock Loads under Shear. 7—Hardness. In addition, there is a rigid inspection of these essentials: 8 — Head Diameter. 9 — Head Height. 10 — Concentricity of Head to Body. 11 — Socket Shape. 12 — Socket Size. 13 — Socket Depth. 14—Centricality of Socket. 15 — Class 3 Fit Threads. 16 — Clean Starting Threads.

In this way Parker-Kalon maintains a new higher standard of quality in Socket Screws . . . a standard that satisfies critical buyers. Send for free samples . . . see for yourself.

PARKER-KALON CORPORATION, 198M Varick Street, New York.

PARKER-KALON Cold-Forged SOCKET SCREWS

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASSACHUSETTS

WILLIAMS' *IMPROVED*

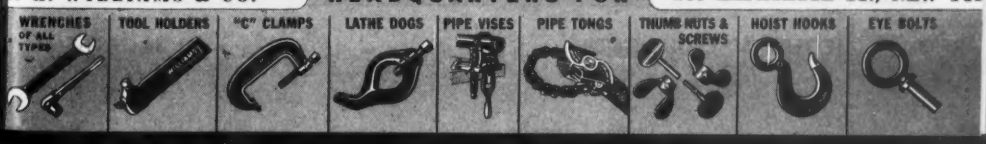
LINE OF TOOL HOLDERS

You will find a Williams' Holder for every regular operation on Lathe, Planer and Shaper — Turning, Boring, Threading, Knurling, Cutting-Off and Side work. Many of these holders have design and utility features which are exclusively Williams. All represent the maximum in quality and performance. No matter what the operation, Williams' Holders assure a solid cutter seat and a chatter-proof, clean-cutting tool.

In addition to the various types illustrated above, Williams' improved Holders are available in all other patterns popularly used, as well as Carbide Turning Tools.

Your industrial distributor can show you the full line of Williams' Holders, or a copy of Williams' Tool Holder booklet will be mailed upon request.

J. H. WILLIAMS & CO. HEADQUARTERS FOR 260 LAFAYETTE ST., NEW YOR



WHEN THEY DEMAND UTMOST PRECISION

DOWN TO 0.0005"

they get it

Modernization and accuracy are outstanding requirements of the Lynch Corporation, Anderson, Indiana.
Production parts in the glass blowing machinery, made by this nationally known manufacturer, call for limits in machining held down to within 0.0005".
This work is assigned to Acmes because these modern machines have met every demand for precision and economical performance.
Many high production features built into Acme Turret Lathes make them indispensable where increased production plus accuracy are required.

DECREASE YOUR PRODUCTION COST BY USING ACME TURRET LATHES

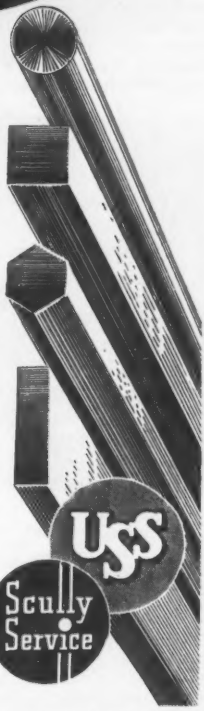
Cincinnati
ACME
UNIVERSAL
TURRET LATHES

Our Tool Engineers will gladly give you an estimate on your requirements.
Circulars showing complete details are available—write for a copy.

...The ACME MACHINE TOOL CO.,
...CINCINNATI, OHIO.

call Scully for COLD FINISHED STEEL BARS

. . . a large and splendidly assorted stock of carbon and alloy grades to meet every requirement.



WHEN you use the exact quality of bar best suited to your individual requirements you reduce production troubles and produce finer products. That's why Scully Service is so valuable to users of Cold Finished Steel Bars. Each of our eight warehouses has a complete line of bars in a wide range of sizes, shapes and specifications, available for immediate shipment.

Get better workmanship and better parts. Call Scully for your Cold Finished Steel Bars. We also carry a complete line of Hot Rolled Bars in standard qualities, forging qualities, and alloys.

"It means much to use the quality best suited to your needs"

SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel, Steel Products, Copper and Brass

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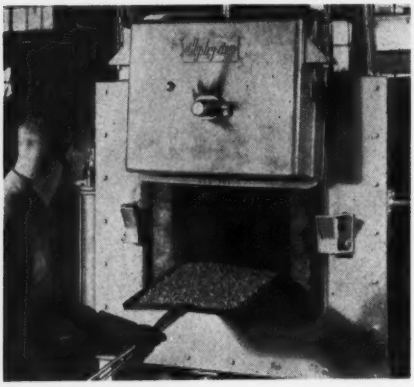
UNITED STATES STEEL

Tips ON TOOL H[illegible]REATMENT

Bright Hardening Small Parts

We have been doing some work for several months at the Lindberg Steel Treating Company which we think is real news and that is the bright hardening of stampings, springs, screw machine parts and other small to medium size production items.

Generally speaking such work must be pickled, sand blasted, or tumbled to remove scale which develops during hardening. But of course a rough surface results over which it is difficult to get a smooth plating job, or any other type of finish. On light section springs scaling often reduces the section to a point of danger.



Hydryzing Furnace in which stampings and other small parts are bright hardened.

Such troubles are very much a thing of the past since Hydryzing has been used for hardening this work, because the parts come out with the same bright finish they had before they were hardened. A good many visitors have been shown the furnace in operation, and without exception they have marveled at the results, for when the quenching oil is wiped off one of the parts and it is placed along side an un-hardened piece it is practically impossible to distinguish any difference. In fact an out-of-town customer recently wrote in to complain that his hardened stampings "are so near those we have untreated that we are fearful of getting them mixed," then he went on to ask us to give the stampings some kind of color so that it would be possible to distinguish the hardened from the un-hardened stampings.

We'd like very much to have you see some samples of the work hardened in the Hydryzing Furnace, and have prepared some packets of samples and we will be glad to send one of these packets to anyone who will write us. They contain a number of small stampings, and springs which have been hardened. Along with the samples, we'll of course send literature pertaining to Hydryzing Furnaces for this work. If you'd rather send in some of your own parts, please feel free to do so. We will Hydryze and return them to you immediately, without obligation.

It's hard to tell the difference. (Those on left have been hardened. Those on right, not.)

Lindberg Engineering Co.

225 NORTH LAFLIN ST. CHICAGO

Lindberg *Furnaces*

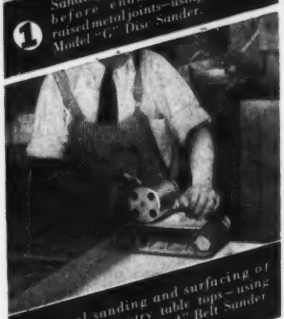
One Tool Sold Another!

...now this ONE plant uses

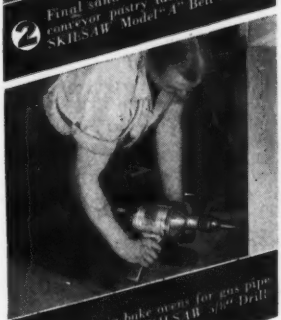
SKILSAW TOOLS

on Five operations!

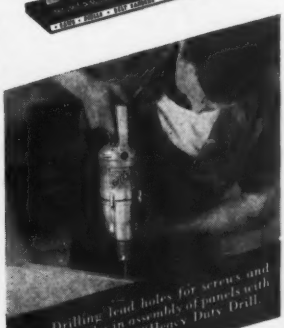
1 Sanding spot welds, cleaning metal before enameling, smoothing raised metal joints—using SKILSAW Model "G" Disc Sander.



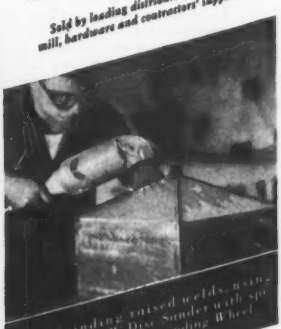
2 Final sanding and surfacing of conveyor pastry table tops—using SKILSAW Model "A" Belt Sander



3 Drilling in bake ovens for gas pipe outlets—using SKILSAW 5/16" Drill



4 Drilling lead holes for screws and bolt holes in assembly of panels with SKILSAW 5/16" Heavy Duty Drill



5 Grinding raised welds, using SKILSAW Disc Sander with specially designed Grinding Wheel

Could you ask for better proof of the cost-cutting performance of SKILSAW TOOLS? Annetsberger Bros., Chicago, manufacturers of bakery and brewery equipment, have made these 5 operations (slow and costly when done by hand!) fast and profitable by the use of SKILSAW TOOLS... each tool's performance had led to the purchase of another until today a large number of SKILSAW TOOLS are saving money and increasing production throughout the plant! Ask for a free demonstration of SKILSAW TOOLS on your own work... and you'll see why they *belong* in YOUR plant!

SKILSAW, INC.
5037 Elston Ave., Chicago

914 E. 40th St., New York. 52 Brookline Ave., Boston. 1409 Spring Garden, Philadelphia. 2124 Main St., Dallas. 918 Union St., New Orleans. 1853 S. Flower St., Los Angeles. 2065 Webster Avenue, Oakland.
Canadian Branch: 85 Deloraine Ave., Toronto.

SKILSAW

Sold by leading distributors of mine, mill, hardware and contractors' supplies.

The Lightest and Most Powerful You Ever Saw!!

Just consider what that means—a ½ H.P. Electric Grinder weighing only 13 pounds. That gives you the advantages of high frequency and air-operated tools without the disadvantages. The "HISEY" Grind-Hog operates directly from standard 220 Volt, 3 phase, 60 cycle Alternating Current power outlets.

This means a big saving in actual current consumption and eliminates entirely the expensive operating and maintenance costs of air compressors or frequency changers.

This also means that the Grind-Hog can be operated anywhere in the plant as it does not require any special piping or wiring.

Unlike other types of Grinders, the "HISEY" Grind-Hog operates at practically constant speed from no load to full load. . .

New Motor Principal Involved

The half horsepower Grind-Hog weighing 13 pounds compares with about 35 pounds for former electric grinders. The bulk of this reduction is made possible by the extreme light weight motor. Altho the motor weight has been cut more than in half, the efficiency remains the same.

Surprisingly, the construction is also much simpler and longer life can be expected. It is of two-pole polyphase design without any brushes, commutator, moving wires or centrifugal switch. Several patents and trade secrets are involved.

Motor Totally Enclosed

The Motor is totally enclosed dust-proof, splash-proof, drip-proof. There are no air cleaners or filters to change or become clogged. The Motor housing and all other castings are of special high tensile aluminum alloy, with steel inserts forming the bearing seats.

Only One Moving Part

There is only one moving part—the spindle and rotor assembly. This is mounted on two double row ball bearings easily accessible yet completely protected from grit and dirt.

Convince Yourself

As this is an entirely new development—so radically different—we are prepared to offer convincing proof—we will ship machine for test under actual service conditions to any responsible company.

Bulletin 56M on Request

THE HISEY-WOLF MACHINE CO.

"It's High Grade If Hisey Made"

Hisey

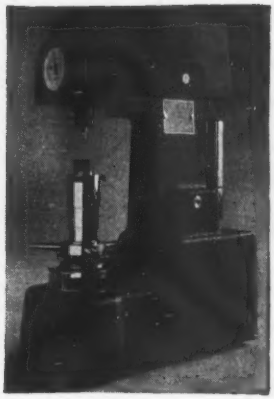
Established 1896

CINCINNATI, OHIO, U.S.A.

Electric DRILLS GRINDERS LOBBERS

Only such speed in the operation of testing as maintains accuracy is worth anything at all.

ROCKWELL
TRADE MARK REG. U. S. PATENT OFFICE
HARDNESS TESTER



Motorized Model

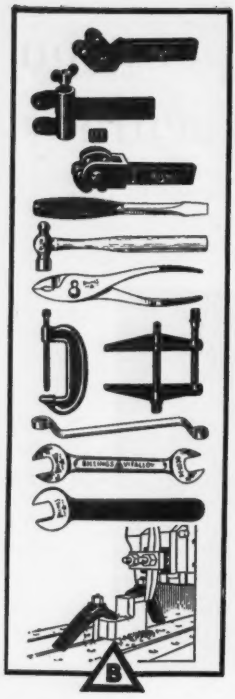
The time consumed in hardness testing is much greater for some sizes and shapes of work than for the smaller and more simply supported pieces. Only for work of the sort that can be very quickly placed and located in testing position is it worth while to give any thought to or spend money for a motorized machine.

It is worth while to consider a motorized machine where many thousand pieces of simple shape are to be tested in eight hours.

For those who really need motorized testers, we make them and we intentionally keep the speed down to what is essential for reliable and therefore useful testing.

WILSON
MECHANICAL INSTRUMENT CO., INC.
Concord Ave. & East 143rd Street
NEW YORK NEW YORK

only Wilson makes "ROCKWELL" Testers



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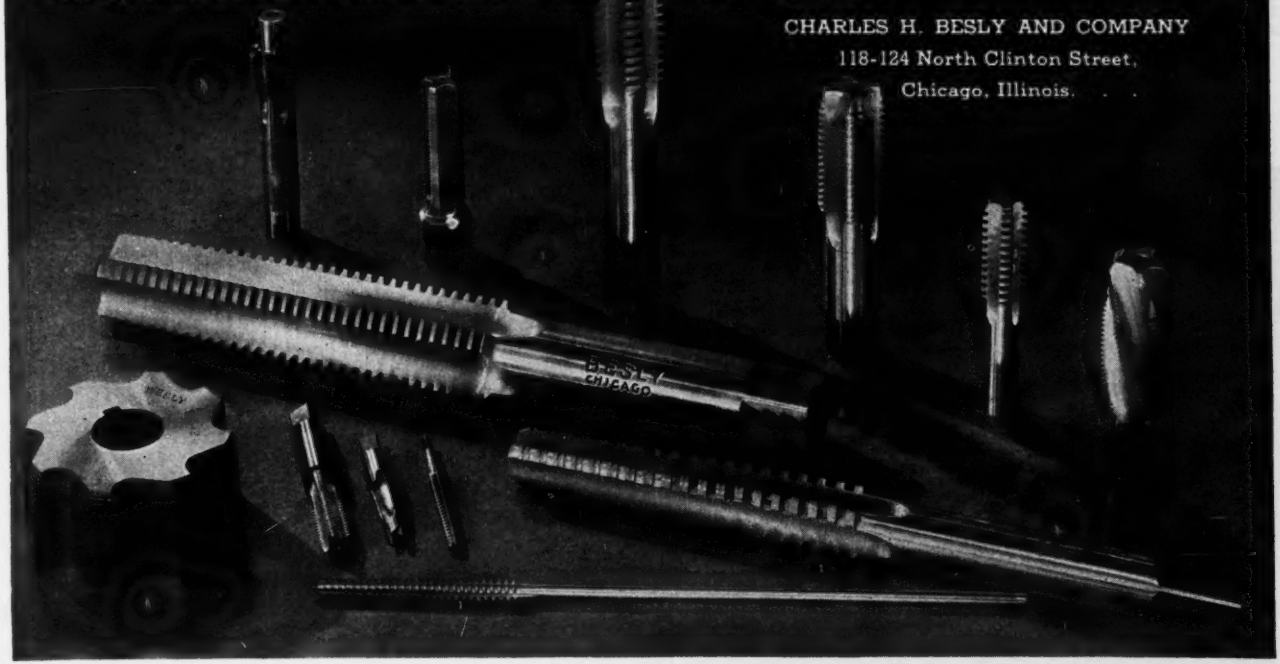

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The EXCLUSIVE Safety Hook for example. Drop forged of special steel, this unique hook gives visible warning when overloaded, opening slowly—without fracture—before any other part of the hoist is strained. Guaranteed to stand up to 150% of its rated capacity without changing dimensions, the Yale hook is a safety valve that cannot fail!

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Only a Yale distributor can supply the Yale Safety Hook. Contact him for free catalogue which gives a full description of the Yale line.

Capacities:
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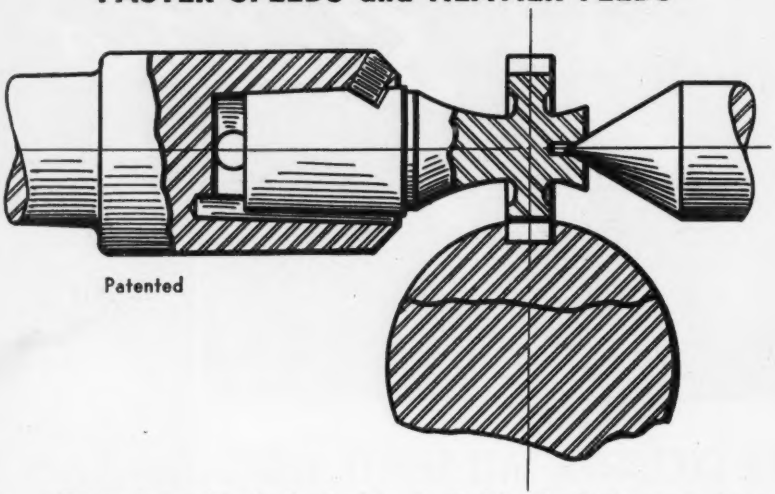

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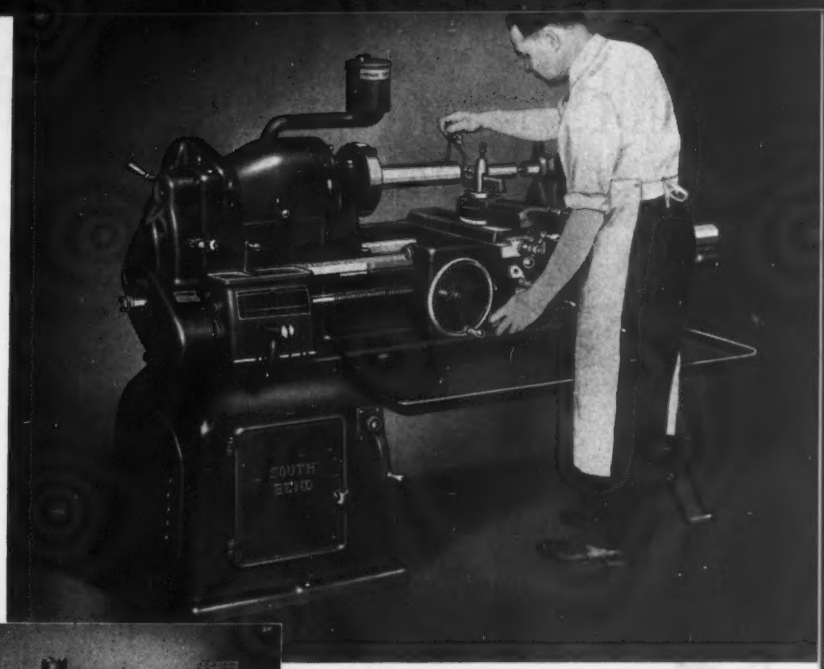
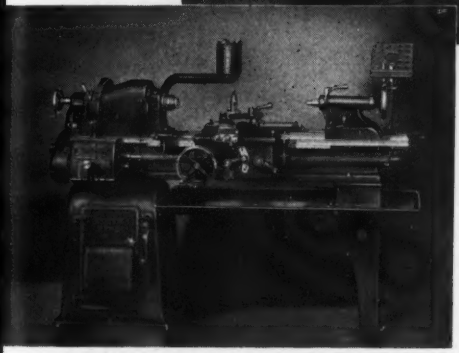
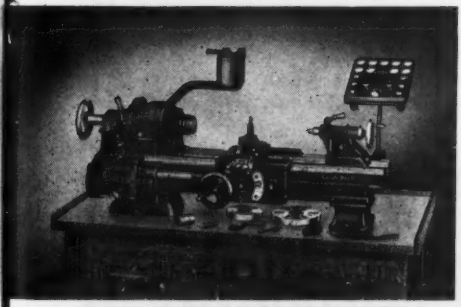


16" x 6' South Band Underneath Motor Driven Lathe



13" x 5' Underneath Motor Driven Tool Room Lathe



9-inch 1" Collet Capacity South Bend Underneath Motor Driven Precision Bench Lathe

SOUTH BEND LATHES

"A Modern Lathe at a Reasonable Price"

South Bend Back-Geared Screw Cutting Precision Lathes are made in five sizes: 9", 11", 13", 14½" and 16" swing. Each size is made in several bed lengths; standard and quick change gear types; with motor drive or countershaft drive. Write for General Catalog No. 98.

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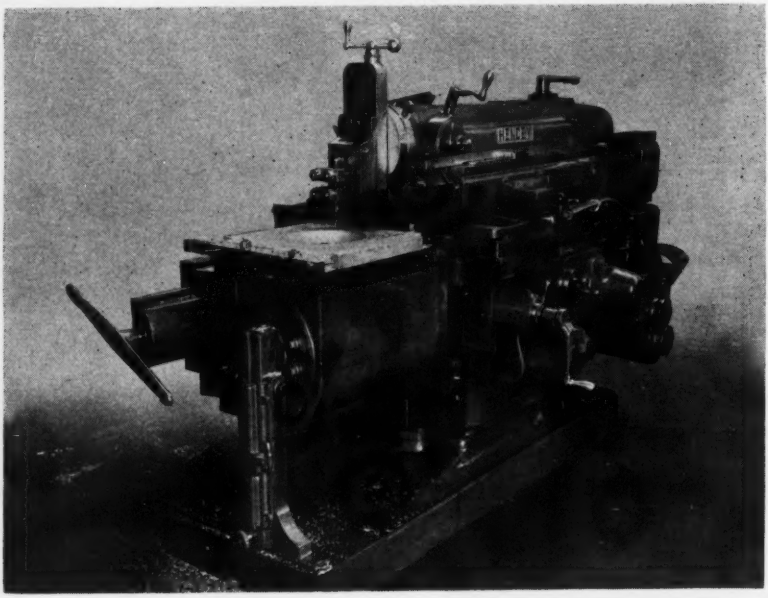
SOUTH BEND LATHE WORKS

Lathe Builders Since 1906

HENDEY 24 INCH Heavy Duty Shaper

Fitted With Universal Table



Here's a Hendey 24-inch Heavy Duty Shaper in a somewhat unusual set-up. This shaper is equipped primarily for a wide variety of work: It has power down feed; power rapid traverse; universal table with tilting top; and is motor driven. It is an installation in one of the well-known Airplane shops in the East.

For the job illustrated the side surface of the table has been brought to a horizontal position and definitely located by a positive stop attached to the bottom of saddle. Table is rigidly clamped to its saddle and trunnion by 4 heavy bolts passing through the large graduated plate in the center. Trunnion is supported at its outer end by and bolted to the pedestal in front. This pedestal carries a buttress tooth load rack which fully absorbs all tool thrust and prevents any deflection of the table under cut. Hendey Standard and Heavy Duty Shapers are made in 16", 20", 24" and 28" strokes; and may be had with either plain or universal tables. *Send for complete bulletin.*

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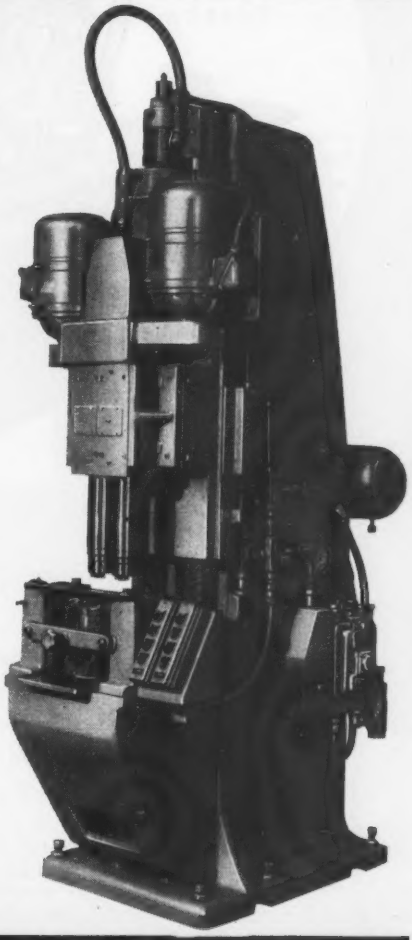

These advantages grow out of fluid power of course; but the number and degree of them are a function of the Oilgear design, construction and principle of operation alone. To make *your* machine more salable and more profitable, get in touch with Oilgear engineers or write for literature. THE OILGEAR COMPANY, 1323 W. Bruce St., Milwaukee, Wisconsin.

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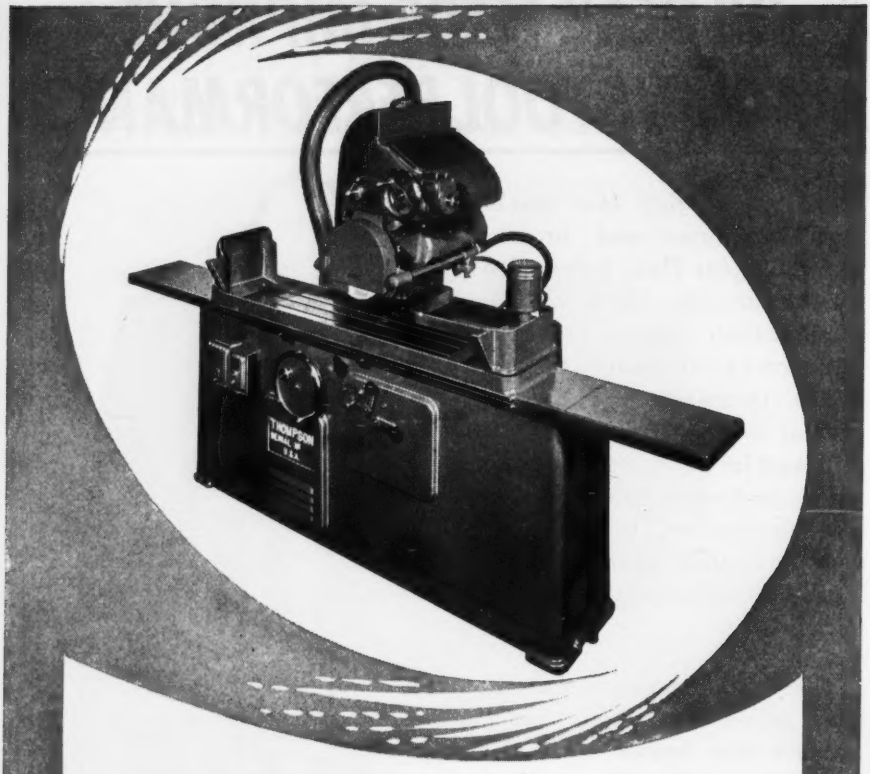

THOMPSON Hydraulic Surface Grinders

Thompson Grinders are earning an enviable reputation as a result of fine performances.

The reason lies in these cost-cutting features:

Balanced "finger-tip" controls • Wide range and adaptability • Hydraulic wheel head feed, rapid traverse and wheel truing • Sealed way bearings • Dynamic balance • Automatic or manual feed, or combination • Greatest possible economy.

You'll want complete details of these cost-cutting grinders—Write today.

THE THOMPSON GRINDER COMPANY

SPRINGFIELD • OHIO

Improved, "husky," modern GARDNER GRINDERS

to carry today's heavy-duty abrasive wheels!

COMPARE this massive, 7800 pound No. 230—40" Gardner Grinder with the standard machine of this type common only a few years ago!

ALMOST 4 TONS of sturdy cast-iron and steel; ample weight and rigidity for the heaviest work—and for carrying heavy 2" or 3" thick abrasive wheels, if desired.

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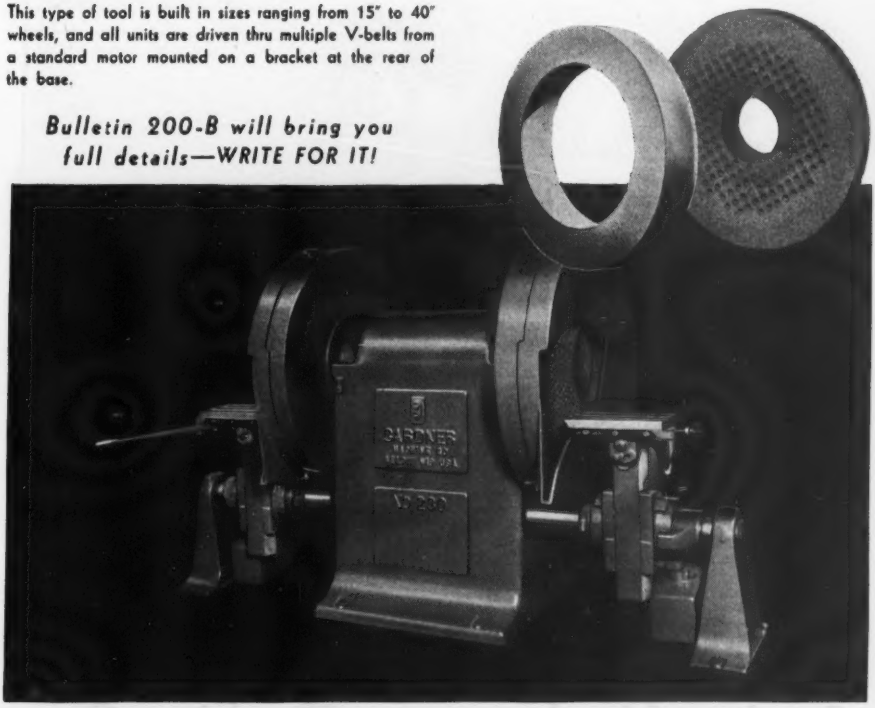
This type of tool is built in sizes ranging from 15" to 40" wheels, and all units are driven thru multiple V-belts from a standard motor mounted on a bracket at the rear of the base.

TODAY'S heavy-duty abrasives are typified by the Gardner WIRE-LOKT Wheels shown below. Built from 1" to 3" in thickness, and for wet or dry grinding, they are long lived, maintenance reducing, thoroughly MODERN cutting members.

Bulletin 200-B will bring you full details—WRITE FOR IT!



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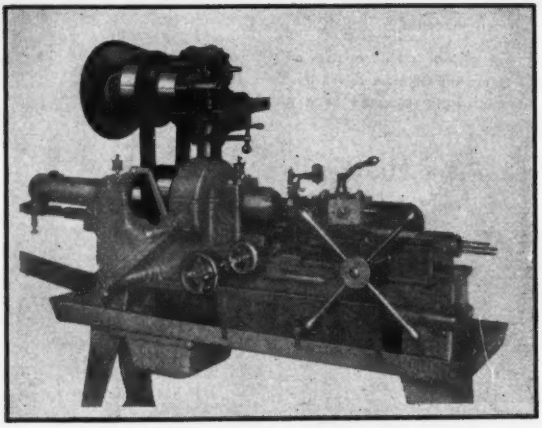

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There is a MODERN Motor Drive for converting every type and size of line shaft driven lathe, drill press, milling machine, grinder, etc., to individual motor drive. The MODERN Motor Drive is especially well adapted for converting cone pulley driven machine tools, as it is a complete, self contained unit, attached directly to the machine, and readily adjustable. Each drive is engineered to meet all the requirements of the machine to which it is applied. • With MODERN Motor Drives, you can locate and group your machine tools at the most advantageous points—where operations may be handled in proper sequence, where valuable space can be conserved, where lighting is best. Speed up production—reduce operating costs with MODERN Motor Drives—the simple low cost way of modernizing old machine tools. Write for full particulars.

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The four 4-spindle No. 16 Buffalo Drills pictured above are paying big dividends in the plant of a Connecticut Instrument Manufacturer. Piece parts requiring as many as 16 different operations of drilling, reaming, spot facing, counterboring, countersinking and tapping go through this efficient production line with a minimum of effort and expense.

High production and low cost call for the best of planning and tooling. But unless the Drilling Machines are capable of trouble free and accurate operation, the expense of planning and tooling is wasted. The machines pictured above have been on high production schedules for five years (manufacturer's name on request).

For nearly forty years, "Buffalo" has been solving drilling problems. May we help you?

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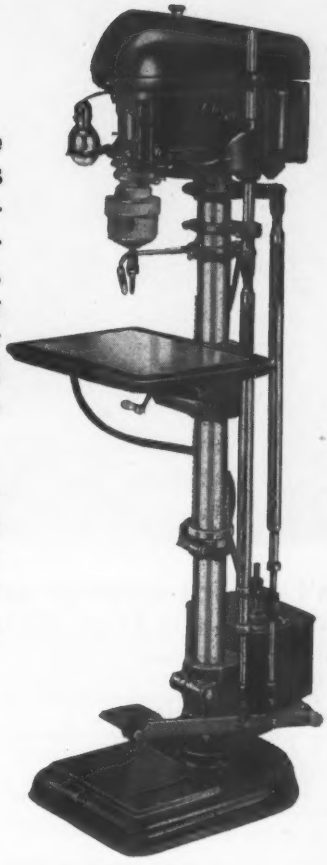

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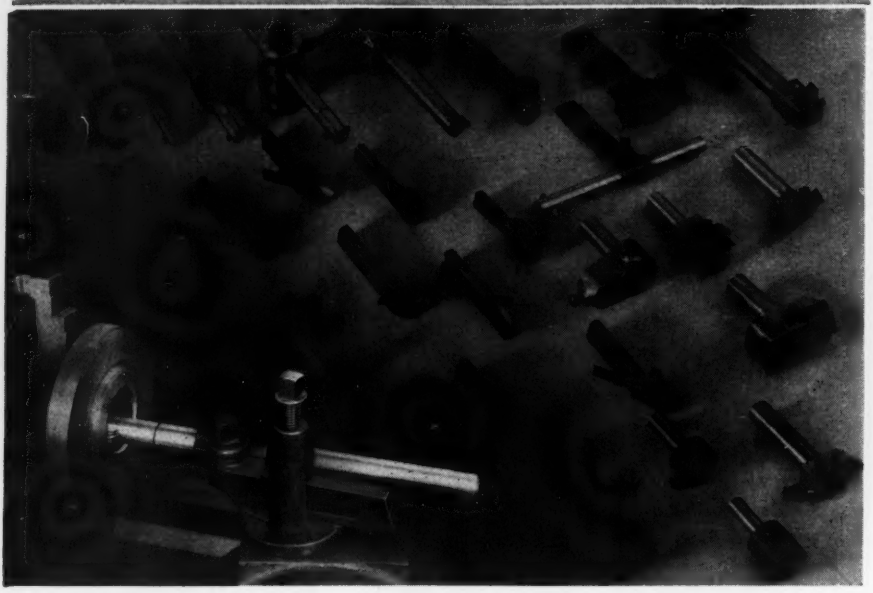

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Lower machining prices today are not entirely a matter of "hard times" and the shortage of work. They are a part of natural progress in metal cutting tools, the lowering of cutting costs with modern ARMSTRONG TOOL HOLDERS.

Cutting tools operating at speeds and feeds established in forged tool days simply can't compete with ARMSTRONG TOOL HOLDERS which permit speeds and feeds *limited only by the capacity of the machine tool.*

Products of two generations of specialization in the development and manufacture of cutting tools, ARMSTRONG TOOL HOLDERS have the *efficiency* possible only where cost can be ignored in the development and perfection of each tool design, the *accuracy* of die forming; the *strength* of special steels, drop forged, and scientifically heat treated; and, the *price* made possible by quantity production. The ARMSTRONG System provides tool holders for every operation on lathes, planers, slotters and shapers — permits higher speeds, lower costs and wider profits on every operation.

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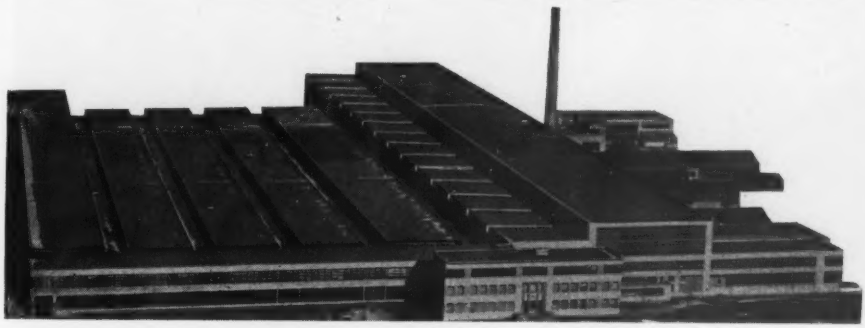
MAY, 1939 VOL. 11, NO. 12



Building the Diesel-Electric Locomotive

This article comprises, in effect, a trip through the new plant of the Electro-Motive Corporation at LaGrange, Ill.

By HOWARD CAMPBELL
Editor, MODERN MACHINE SHOP

PROGRESS — in all that the term means when applied to the present age—is nowhere better symbolized than in the modern Diesel-electric locomotive. Designed to obtain the highest possible operating efficiency from the combination of a Diesel oil engine and and electric generator, the mechanism is housed in a "streamlined" jacket that veils every detail of engineering apparatus. Instead of the dead black which has been the standard coating for steam locomotives, the new engines are attractively decorated with bright plating and gay colors as though to announce to the world that railroad transportation has entered a new era.

Fig. 1—The six pads upon which the generator and engine are to be mounted are milled with this Hoess portable milling machine.

And so it has. In 1931 trains on American railroads operating on a regular schedule of 60 miles per hour or better covered 1,100 miles a day. Today trains operating on a 60-mile an hour schedule travel more than 40,000 miles a day. The railroads have been quick to adopt the new type of engine, creating a demand which has forced the development of an entirely new technique in locomotive construction.

The largest plant in the United States devoted exclusively to the building of Diesel-electric locomotives is the new plant of the Electro-Motive Corporation at LaGrange, Ill. The plant covers approximately 14 acres, including under one roof complete facilities for the fabrication of Diesel-powered switching and passenger locomotives with a capacity of one complete locomotive per day.

The framework of the building is of all-welded steel and the walls and roof are of almost continuous glass, giving the huge plant practically the equivalent of daylight conditions. A long north-and-south bay on the west side of the plant houses the receiving and material warehouse departments. A train of fourteen 60-foot freight cars can be set on a spur track extending the length of this bay.

The corresponding bay on the east side of the building houses the engine assembly department, engine test, and transmission test departments, and also contains the heat treating department where all small steel parts are heat treated in a battery of fifteen gas, electric, and air furnaces of the most modern type.

There are seventeen transverse bays between the two long outer bays which constitute the main manufacturing area, each bay being 48 ft. in width and equipped with overhead cranes of from 5 to 15 tons capacity. These large bays permit the use of straight-line production methods.

In the building of a Diesel-electric locomotive, the Diesel engine and generator are mounted on a steel frame or base which also serves as the bottom cover plate. The generator and engine are mounted on six pads that are welded to the cover plate. In order to provide a flat, even foundation, the pads are milled, the machining operation being performed with the Hoess portable universal milling machine shown in operation in Fig. 1.

The machine travels on two rails, placed parallel, one each side of the engine base so that the cross rail of the miller straddles the base. With the rails in position and the machine properly set up for the job, the entire operation is performed without changing the position of the rails. The operation of the machine is entirely

Fig. 3—Close view of welding operation showing flow of pulverized slag over point of contact to prevent oxidation of the weld.

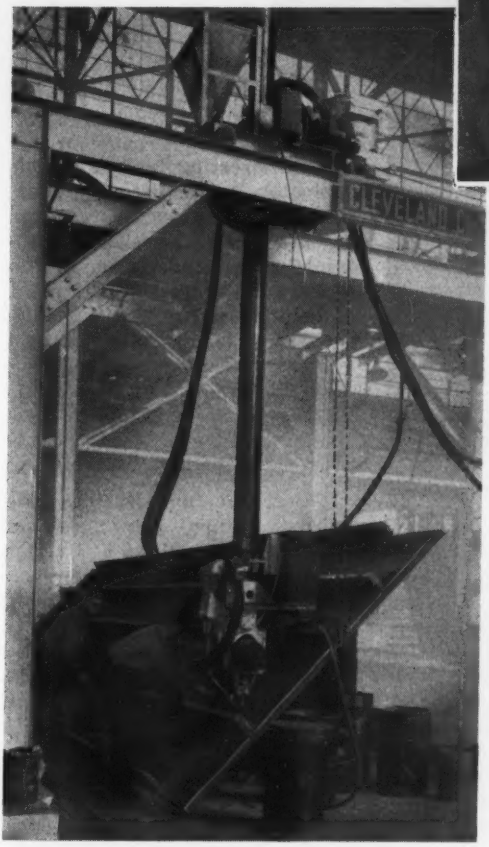


Fig. 2—Welding four 2 x 7-in. steel sills to the underframe. The welding machine is carried on the lower end of a vertical shaft which is suspended from the carriage of a Gantry crane; thus movement in three planes can be obtained.

automatic, and it travels the full length of the base. Power is supplied by a 5 h.p. motor. Twelve speeds are available, from 11 to 67 r.p.m., and the machine can be fed at a rate of as high as 0.080 in. per revolution of the spindle. An inserted-tooth cutter is used for this operation.

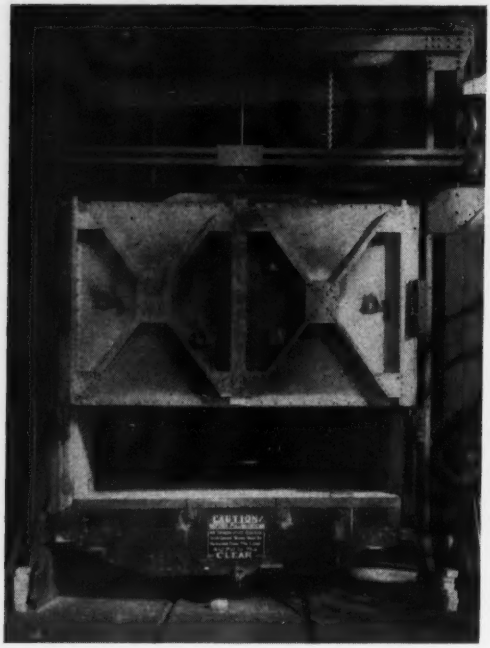


Fig. 4—Annealing oven into which the underframes are moved on a flat car for heating to relieve any strains which may have been set up in welding.

The underframe consists of a 2 x 10-in. x 41-ft. top cover plate of double-rolled steel, to which are welded four longitudinal sills of 2 x 7-in. steel. The welding operation is shown in process in Fig. 2.

The equipment consists of an arc welding machine attached to the lower end of a vertical shaft which, in turn, is suspended from a carriage on the top of a Gantry crane structure. Three electric motors are required to power this machine; one to move the carriage cross-wise on the crane, one to raise and lower the the welding machine as required, and one to move the crane longitudinally on its track.

Copper-coated welding rod is used, supplied in a coil so that it can be fed automatically to the machine. With the plate tilted at an angle of 45 deg. as shown in the illustration, the rod is fed to the machine as the crane feeds the length of the plate. Feeding at a rate of 18 in. per min., a ¾-in. bead is laid in the angle of the sill with the plate. When all of the sills have been welded on one side, the plate is tilted at the opposite angle and the sills are welded on the other side.

An interesting feature of this operation is the use of pulverized slag to prevent oxidation of the weld. The slag is contained in a hopper from which it flows by gravity to the point of contact, as shown in Fig. 3, the supply being controlled by a valve. By keeping the weld covered with slag as the bead is laid, air is kept from the new weld metal and oxidation is prevented.

When the underframes are welded, as many as six of them at a time are piled onto a flat car and the car is moved into the annealing oven shown in Fig. 4. The oven is 72 ft. long, and is fired by 32 gas burners—16 on a side—arranged so that the flames enter the oven through holes in the sides. The frames are heated to from 1,250 to 1,400 deg. F., the burners being automatically controlled by thermostat, and are then allowed to cool to approximately 100 deg. F., at which point they are removed and allowed to finish cooling in

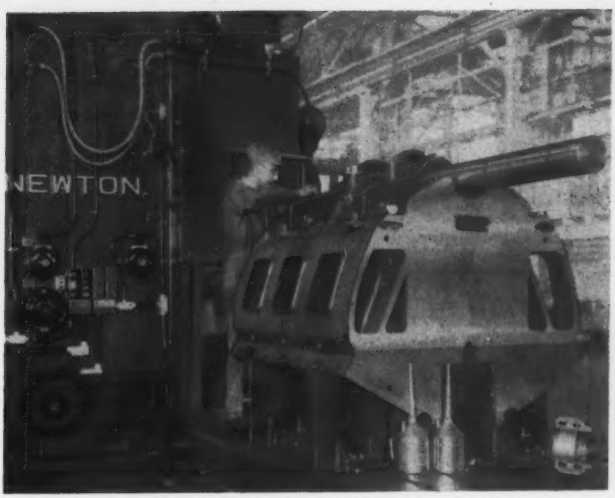


Fig. 6—Boring crankshaft bearings in crankcase for a Diesel locomotive power unit.

the air. Heating the frames in this manner relieves any strains which may have been set up in the welding operation.

The illustration Fig. 5 shows an operator welding the end-plates to the crankcase for a 12-cylinder Diesel engine. To enable the mechanic to obtain the best weld possible, the crankcase is mounted on a fixture consisting of two United Engineering welding manipulators which are anchored to a triangular-shaped subbase in order to be able to tilt the faceplate 45 deg. back underneath the vertical. Both of the tables on the fixture are power operated and not only can be tilted to a 45-deg. angle, but at the same time can be independently rotated throughout a 360-deg. circle. This combination of rotation and tilting makes it possible to make all welds in a down-vee position, thus ensuring better penetration, elimination of undercutting, reduced warpage, and minimum welding costs. The fixture is equipped with a 5 h.p. motor for rotating and a 7½

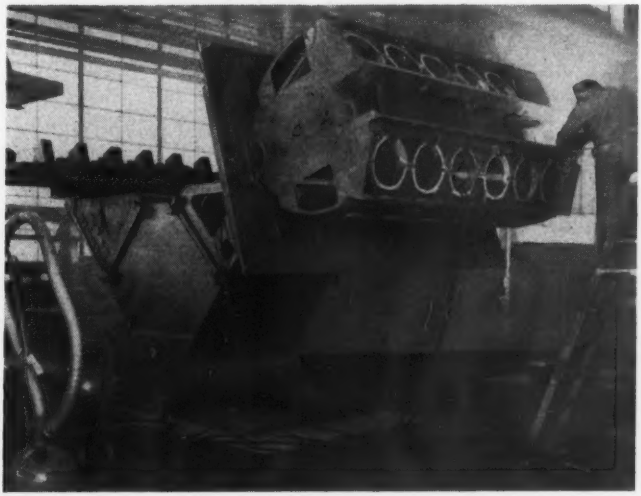


Fig. 6—Welding end-plates to crankcase for a 12-cylinder Diesel engine. This power-operated fixture makes it possible to hold the work at any desired angle for welding.

Fig. 7—Boring holes for cylinder liners in the crankcase, for which a special Ingersoll boring machine is used.

h.p. motor for tilting, both motors being controlled by a push button. The operating mechanism is contained within the housing.

To bore the main bearings in the crankcase, the case is located, with the bearings uppermost, in a fixture on the table of the Newton horizontal boring and milling machine illustrated in Fig. 6. The machine consists fundamentally of a bed with flat ways upon which is mounted a movable column carrying a spindle from which the boring bar is driven. At right angles to the column is the bed carrying a work table upon which the crankcase is mounted.

The boring bar is supported by brackets which are bolted to the case and which provide adjustment so that the bar can be properly centralized in the bearings. All seven bearings are bored simultaneously, three roughing cuts and one finishing cut being required to finish the bearings to the drawing dimension of 8.000 plus or minus 0.0005 in. One of the bearing caps can be seen on the table at the lower right in the illustration. The entire operation, including setting up and clamping, taking three boring cuts and adjusting the single point tools between cuts, unclamping and removing the piece, requires from 18 to 27 hours.

The operation shown in process in Fig. 7 is that of boring the holes for cylinder liners in the crankcase, this operation being performed on an Ingersoll single spindle inclined housing boring machine. To facilitate the assembling of the liner to the case, each hole is bored in five steps. In other words, the length of the hole is divided into five equal sections, each section being bored a little smaller than the preceding section, so that a liner which has been turned accordingly will only have to be pressed one-fifth of its length in order to seat it in place.

The first step is bored to 13.687 minus 0.005, the second step is bored to 12.250 plus 0.005, the third step is bored to 12.062 plus 0.001 and minus 0.000, the fourth step is bored to 11.150 plus 0.005, and the fifth and last step is bored to 10.251 plus 0.002 in. A liner turned to corresponding diameters with allowances for the proper amount of press fit can be dropped four-fifths of the distance into the bore before applying pressure, but the pressure is applied to the whole length of the liner as it is

pressed into place. By using this method of fitting, a great deal of time is saved in assembling and disassembling the liners and crankcases.

The boring head ways are built at an angle of 22½ deg., which corresponds to the angle of the bores in the crankcase; thus the bores will be accurately machined at the angle specified. The head is fed down through the cut by a hydraulic unit through which cutting feeds of from ½ to 2½ in. per minute are obtainable. The head is rapid traversed to operating position before the automatic feed is started. The spindle speeds are controlled through an individual motor mounted on the boring head, the speeds being varied through a hand-operated rheostat. The spindle speeds, boring head feeds and table feeds on this machine are independent of each other.

As fast as a bore is machined, the head is withdrawn and the table is moved by rapid traverse to operating position for the next bore, an indicator attachment aiding the operator in locating the workpiece correctly. After the cylinder bores on one side of the crankcase have been completed, the fixture is swung end for end, bringing the six bores on the opposite side of the case into line for machining.

Engine frames are milled on the Newton straight line milling machine shown in operation in Fig. 8. Basically, this machine consists of five milling heads and one boring head, two swivelling milling heads being mounted on the floor upright, two swivelling milling heads on the front face of the cross girt, and one non-swivelling milling head being mounted on the rear upright. An outboard bearing on the rear cross girt supports a horizontal cutter arbor. A swivelling boring head is also mounted on the rear face of the cross girt.

Fig. 8—Machining the sides and tops of engine frames. Eighteen motors are built into this machine to drive the various units.

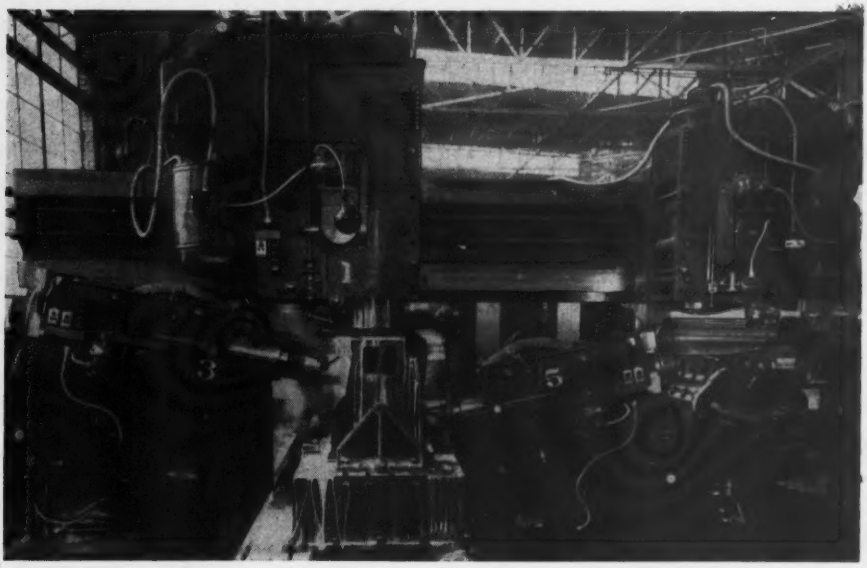


Fig. 9—Cylinder liners are machined in these two Fay Automatic Lathes.

With this boring head, piston bores up to 13-in. diameter can be machined. Each head is adjustable on its support.

As can be seen from the illustration, the side heads can be tilted at any desired angle. The illustration shows the machine milling the top surface, two vertical side surfaces and two angular surfaces simultaneously. Three engine frames are set up for machining at one time, which is possible inasmuch as the machine table is 17 ft. long and has a travel of 25½ ft. Eighteen motors are mounted in various parts of this machine to supply power for the various functions, three of which are 20 h.p. motors, two are 30 h.p. motors, one is a 10 h.p. motor, and the others are of various sizes as required.

Cylinder liners, which are of cast iron, are normalized in a furnace before machining and then are machined in the two Fay automatic lathes shown in Fig. 9. To perform the first operation, the cylinder is held on air-operated expanding headstock and tailstock fixtures which grip the piece in the rough bore. The outside diameter is turned by a combination of eight tools which are mounted on the carriage. At the same time, five tools mounted on the back arms face the required dimensions on the shoulders and both ends of the work. While these cuts are in progress, a tool mounted in the facing attachment rough faces the large counterbore on the end of the liner. Between the first and second lathe operations the cylinders are finish bored, the finish bore being necessary in order to locate the piece for the second lathe operation. In this operation the outside is finish turned by the carriage tools while the back arm tools are finish facing, chamfering and forming two semi-circular undercuts. During this portion of the

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Fig. 10—Finish boring the cylinder liners.

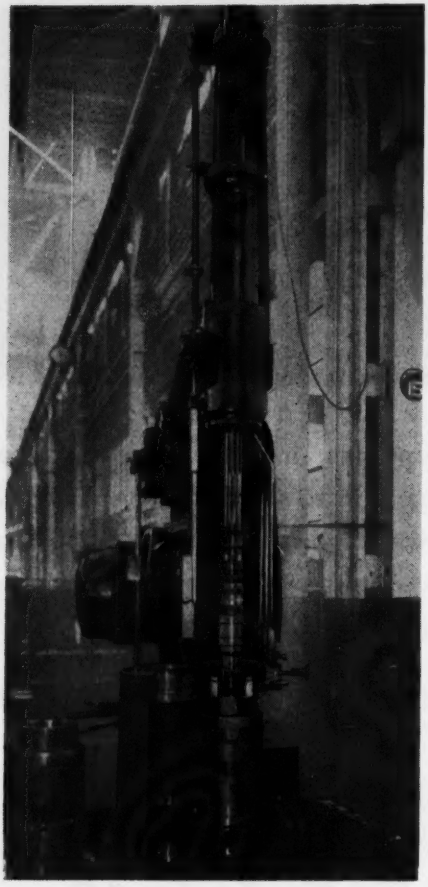
cycle a tool in an auxiliary arm is finish facing the counterbore in the large end of the work and the tool held in the overhead slide is cutting a spiral groove in the counterbore.

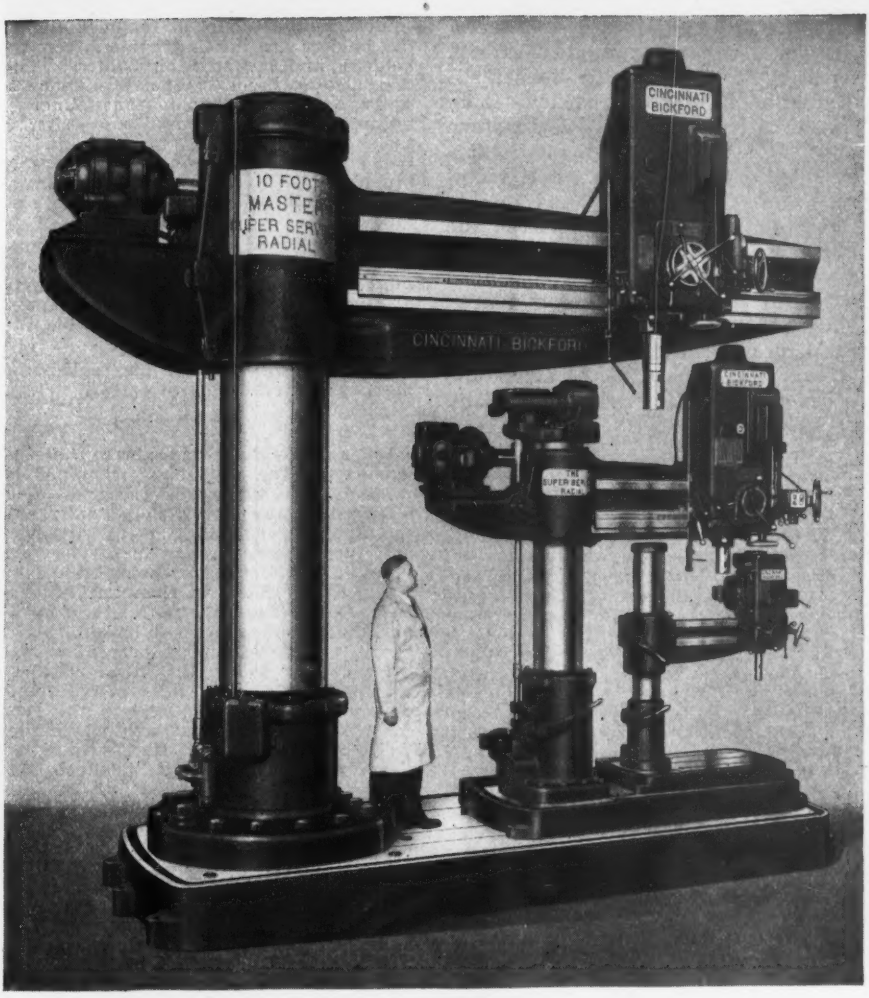
Upon the completion of this part of the work, all tools withdraw by fast traverse except a tool mounted on the carriage which comes into position to size the diameter of the counterbore and then also withdraws. All tools used on this operation are tipped with cemented carbide.

The finish boring operation on the cylinder liners is performed in the Baush hydraulic vertical boring machine shown in Fig. 10. To hold the liner for machining, it is clamped vertically in a box jig, as shown, individual clamping screws being used in both the upper and lower cross arms to lock the liner securely in position. A four-blade cutter head is used for the finish boring job.

After the cylinder liners have been

Fig. 11—The bores in the cylinder liner are honed to a glass-smooth finish with this Barnes hydraulic honing machine.





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completely turned, bored and faced, the bores are given a glass-smooth finish by honing with the Barnes hydraulic honing machine shown set up for operation in Fig. 11. A six-stone hone is used and the spindle rotates at a speed of 300 r.p.m., while reciprocating at a rate of 30 reciprocations per minute. Inasmuch as the machine is operated by hydraulic power, this speed and travel can be varied instantly by the simple manipulation of the lever which controls the hydraulic mechanism. Removing approximately 0.002 in. of stock, the bores are finished to within 0.0005 in. of drawing size.

(The second half of this article will be published in the June issue of this magazine.)

Westinghouse Industrial Motors. Hoist and crane motors, designed to meet exacting electrical and mechanical requirements of severe reversing and plugging service with frequent starting and stopping, are the subject of a four-page illustrated leaflet published by Westinghouse Electric & Manufacturing Company. The motors have intermittent ratings of from 1 to 200 h.p., and are designed for operation at commercial frequencies and voltages. Economical operation, sturdy construction, sealed-sleeve bearings, thorough insulation, and a rigorous radio-frequency test are features stressed.

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Small Tools and Machine Accessories. The complete line of chucks, sleeves, sockets, tool holders, arbors, boring bars, spacing collars, punches and dies, cutters, and other small tools and machine accessories made by Scully-Jones and Company, 1913 S. Rockwell St., Chicago, Ill., is illustrated and described in detail in Catalog No. 400, now being issued by this company. The catalog pages are 8½ x 11 in. in size and the 320 pages are bound in an attractive brown imitation leather board cover with gold leaf decoration.

The line of chucks made by this company includes chucks for drills, taps, cutters, center drills, and the well-known "quick change" chucks. Included among the holders are floating holders, tension holders, and compression holders. The line also includes sectional expanders, roller expanders, backing-out punches, milling machine arbors, and similar tools. Each different type and kind of tool is shown, the book being profusely illustrated with photographs and drawings. Specifications and prices are also included.

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Lincoln Welding Procedure Bulletin. Procedures for producing all types of welds in mild steel, for welding all metals used to any extent industrially and for applying surfacing metal to meet any type of wear-action in service, are given in a bulletin now being issued by The Lincoln Electric Company, Cleveland, Ohio. The bulletin is profusely illustrated and contains 36 pages, 8½ x 11 in. in size. Complete procedures are given for the following: flat, vertical or overhead welding of mild steel; single or multiple pass welding and for poor fit-up in mild steel; flat welding of fillet welds in mild steel; flat welding of deep-groove joints in mild steel; flat welding of deep-groove joints in high tensile steels; general welding of high tensile steels; welding of light-gauge steel, 18-8 and 25-12 stainless steels, 4-6 chrome steels, high manganese steel, cast iron, aluminum, bronze, brass and copper; for surfacing to produce moderate shock and abrasion—resisting welds; rolling or sliding abrasion-resisting welds, and for making tool steel cutting edges on ordinary steel and rebuilding worn tools and dies.

The procedures, which cover all types of welding, include: recommended current ranges and arc voltages; suggestions regarding arc length, polarity of welding current, distance to hold electrode from work, cleaning beads, welding up or down, use of wide and narrow beads, peening to increase hardness, quenching, weaving the electrode, and so on. Properties of welds produced in various metals are given and typical welding applications are illustrated. Ask for Bulletin 401-A.

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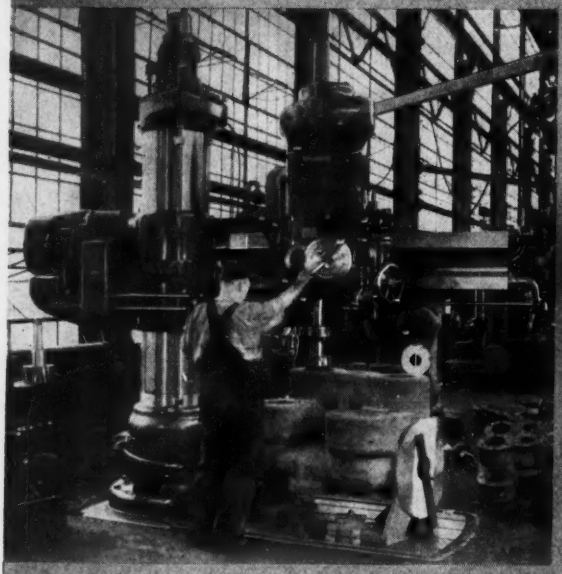

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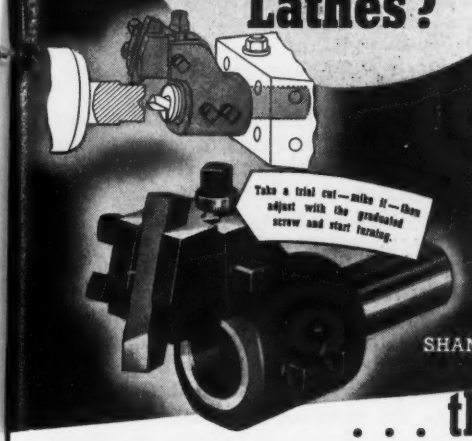

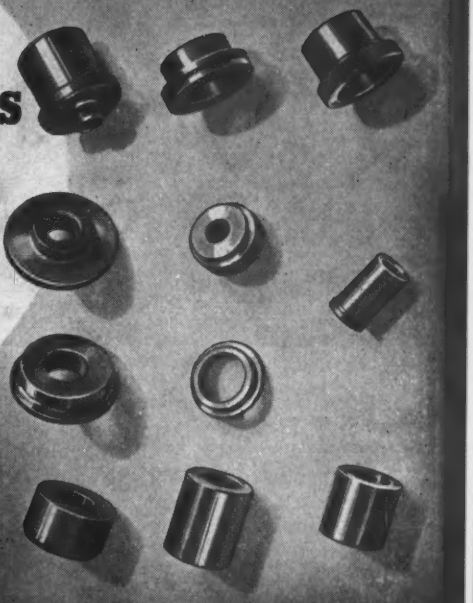

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The Machinability of Metals

(Presented before the Cincinnati Chapter, American Society for Metals)

By PROFESSOR O. W. BOSTON
College of Engineering, University of Michigan

ANY discussion of the machinability of metals involves a number of what I consider completely independent factors. Among those are the material that is being cut — aluminum, iron, or whatever it is—the tool that is doing that cutting—its shape, material, and so forth—and the cutting fluid that is involved if one is involved; also the process, whether turning, drilling, milling, threading; and lastly, the form of the chip and the size of the chip. By changing any one factor, different results will be obtained. One set of cutting conditions will not be satisfactory for machining all metals, but rather, a set-up must be selected to yield results best suited to each case.

Machinability, in my opinion, is a term that is generally used to indicate the relative ease or degree of satisfaction with which a metal is machined, or by which a tool performs, or by which the cutting fluid performs, and again I emphasize the three because I do not believe you can separate them. It is evaluated in several ways, depending upon the objective sought. One of the most general, perhaps the most common, but again perhaps the most futile or useless, is power. Among my own works, in one of the early works I published I spoke of power and I was criticized for that, but at that time I felt that the field of introducing forces in cutting, radial forces in turning, and so forth, had not been completed. Again, the man in the shop is interested primarily in tool life. I find that invariably when a company comes to me and wants some test on tools, cutting oils or materials, they are primarily interested in tool life.

In perhaps just the last few years has the question of finish been considered. Finish is believed by many to be one of the most important things. But in many types of operation, as I get it from contact with men in industry, I believe that tool life is probably the most important of the three; that is, of power, tool life, and finish.

Now, one of the next things is the question of materials. I am not going to go into such detail on this subject because it is altogether too lengthy. The cutting properties of the metal cut is dependent on the size and shape of the part, whether it is right from the furnace, the temperature at which it is cast, the manner in which it is heated, the manner in which it is cooled, whether in a hot or cold-finished condition, and so forth. It is a long, long story.

Then we come to the tools them-

selves, as I have already mentioned. You may want a tool to give a good finish. Again, you may want a tool for long life and surely a tool to give you low power, and there are certain things that you can say for each one. In the case of finish, or to be specific, in order to combine all three, the tool, material and power, probably the best way to get a good finish is to reduce the size of the built-up edge. That may be done by combining any two or all of such factors as keener cutting edge, higher speeds, finer cuts, lighter cuts, less depth and lastly, introducing of cutting fluids. I think that high speeds are of more importance to the producing of good finishes than any other of the factors involved. You must of necessity have light cuts in order to have proper tool life, but I believe high speeds are of primary importance. Standards of surface finish and practical methods of measuring them are needed urgently. The profilograph and profilometer are two devices now available for this purpose.

We all know that, in many cases, water produces the best finish, but I do not mean by that that oils are not used. Water is not adaptable to many operations because of its corrosive properties. I mention that because it is so difficult to state what requisite is required in the cutting fluid to produce a good surface.

There is another debatable question. In speaking of cutting fluids, what is the function of the fluid? Is it to cool or is it to lubricate? I believe personally that its cooling property is of more value than the lubricating property. I will refer to that as I go along.

Machinability

Machinability is a general term used to indicate the relative ease or satisfaction with which a metal is machined, or a tool or cutting fluid functions, in operations such as turning, drilling, milling, threading. It is evaluated in several ways, depending upon the objective sought. The rating may be based on:

1. Tool life; that is, the cutting speed for a given tool life, or vice versa, in turning, milling, drilling, and so on when cutting under fixed conditions of tool, cut, material, and cutting fluid;

2. The force, energy, or power required to perform the operations of turning, milling, and so on;

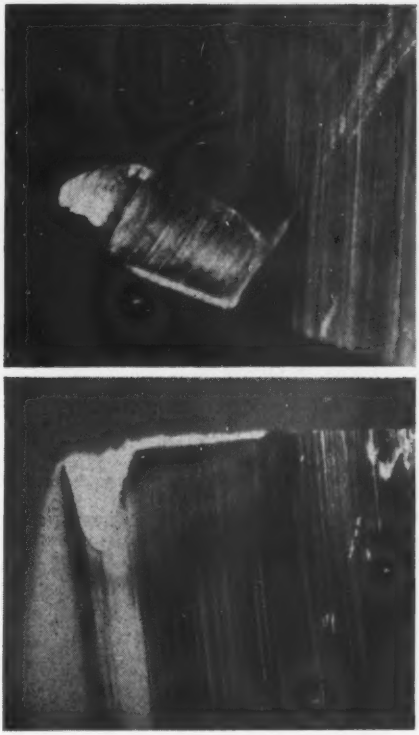

Fig. 1—The face and flank of a high speed steel tool which has failed by cupping in turning Monel Metal. Depth of cut, 0.100 in.; feed, 0.0127 in.; width of land supporting built-up edge, 0.0044 in.; width of crater from the land, 0.050 in.; width of land worn on flank, 0.004 in. X10.

3. The torque and thrust in drilling, counterboring, and so on;

4. The cutability as measured by drill or saw penetration under constant feeding pressure, and similar methods;

5. The condition of the machined surface, surface quality;

6. The cost of removal of a given quantity of metal under specific conditions; and

7. The temperature developed at the tool point. By these tests, materials, tools, or cutting fluids may be rated. These ratings vary when carried out under different conditions of tests. In rating tools, for example, one rating may be found based on tool life when cutting one steel when the tool is ground to a given shape; another if the tool shape is changed or if the structure or analysis of material cut is changed.

If tool-life tests are run as a basis for machinability rating, I recommend that the equation $VT^n = C$, representing the relation between cutting speed **V** and tool life **T**, be established, as both the constant and exponent may change as the variable (tool, material, or cutting fluid) is changed. A rating established on a cutting speed for a 60-minute tool life may be quite different from that based on the cutting speed for 120-minute tool life.

'The variables involved in each of the factors, the metal cut, the tools, and the cutting fluids, may be summarized for each as follows:

Metal Cut

The cutting properties of the metal cut is dependent on:

1. Chemical composition, as representing irons; carbon and alloy steels; special steels; free-machining steels containing lead, sulphur, selenium, or manganese; and the great variety of non-ferrous metals and alloys;

2. Melting and casting practice and grain size;

3. Fabrication — whether cast, forged, drawn, or hot or cold finished;

4. Heat treating and resulting metallographic structure;

5. Physical properties, such as tensile strength, elastic limit, hardness, elongation, reduction of area, and work-hardening capacity; and

6. Size and shape of the part.

Steels are sent to the shop for machining either in a cast, forged, hot-rolled, or cold-finished condition with a fine-, medium-, or coarse-grained structure. They may be fully annealed for a lamellar pearlitic structure, normalized for a fine sorbitic structure, specially annealed for coarse, open - grained spheroidized structure, or quenched and tempered for dents, close-grained troostitic-sorbitic structure. They may have any desired hardness. The machinability rating of a steel is, therefore, a function of many variables.

Steel parts showing martensitic, or troostitic constituents usually are finished into desired forms in the machine shop by grinding operations. Austenitic steels are machined with super tools. Structures of sorbite show Brinell hardness values of a wide range (from 170 to 320). They are being machined on a production basis at speeds somewhat lower than those for hot-rolled, annealed, or normalized structures.

Normalizing is generally recommended for low-carbon carburizing steels prior to machining, and for the medium-carbon (0.30-0.40 per cent carbon) steels. They are treated at high enough temperatures to coarsen the austenitic grain and then cooled fast enough to give a very fine pearlitic (sorbitic) structure with nonfree ferrite.

In steels containing 0.50-0.60 per cent carbon, the annealed structure with lamellar pearlite is considered

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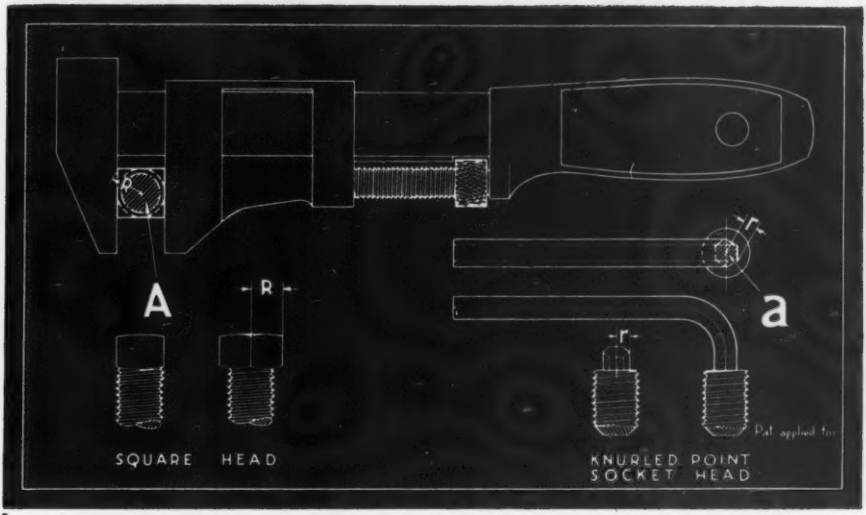

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The Square Head Set Screw shown on the left between the jaws of the monkey wrench is of the same diameter as the Socket Set shown on the right with hex bar wrench inserted. Note particularly the two critical sections marked "A" and "a." The ratio between areas "A" and "a" is about 3 to 1, and as the steels of which the screws are made differ very little in strength, it is obvious the Socket Screw would twist off at a torque that would not affect the Square Head appreciably. The Socket Screw can't possibly be pulled up as hard as the other, proving the need of the knurled point. The difference between the possible tortional effort can be appreciated by referring to the torque radii "R" and "r."

Fig. 1641 Pat. App. For

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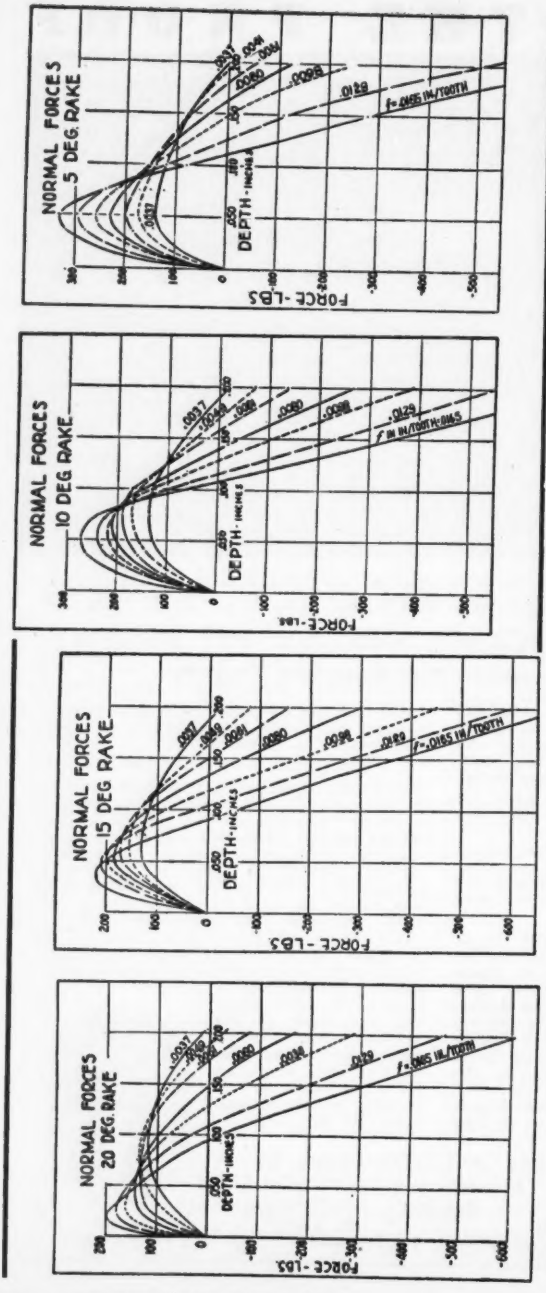

Fig. 2—Summary of experimental data showing the relation between cutting speed and tool life when turning S.A.E. 3140 steel annealed while the depth was varied for a constant feed of 0.0125 in. High speed steel tools of the shapes 8-22-6-6-15-3/64 and three cutting fluids were used for each depth of cut.

best with the pearlitic grains not entirely surrounded with ferrite. The eutectoid steels are machined best after the spheroidizing anneal.

Mr. R. B. Schenck favors the single high temperature treatment, in which the low-carbon gear steels are either furnace cooled or air cooled through the lower critical point from 1,750 deg. F. or higher. The high-carbon steels all require slow cooling through the lower critical temperature.

Dr. N. E. Woldman, of the Eclipse Aviation Corporation, recently observed that the oil-hardening steels, such as S.A.E. 6150, 3250, and 4350, which machined best in automatic machines, had a coarse, spheroidized structure, while the steel which was most difficult to machine had the lamellar-pearlitic structure. It also was generally observed that, with S.A.E. 6150 steel, the fine, close-grained spheroidized structure dulled the tools more readily and developed more heat during machining than the

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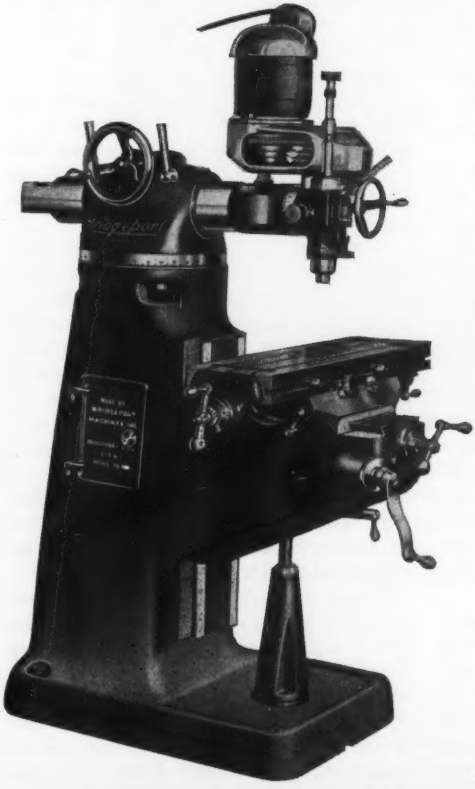

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coarse, open - grained spheroidized structure.

In broaching, it was observed that a spheroidized steel gave a ragged, rough, and often a torn surface, while the sorbitic or lamellar-pearlitic structure produced a smooth and clean surface and longer tool life. In gear cutting it was shown that a spheroidized structure produced a rough surface with burrs on the tooth end, while a lamellar-pearlitic or sorbitic structure produced a smooth, clean surface with no burrs adhering. This indicated that a compromise in structure must be accepted to obtain the most economical machining by the various processes.

Steels of fine grain size (ASTM 5 to 8), when used as oil-hardening or carburizing steels, are highly ductile, particularly if they are abnormal, show less warpage on heat treatment, and appear to be best for producing fine finish. Steels in a coarse grain size (ASTM 3 to 5) condition seem better adapted for machining. Steels of each grain size should be cut with tools appropriately ground. For rough lathe work, where surface finish on the steel is of minor importance, low hardness is more important than low ductility. The subject of inherent grain size and its relation to machinability is still highly controversial.

Free-cutting steels for screw machine work usually are cold finished to give accuracy of dimension, freedom from scale, and improvement in machinability. (The cold finishing consists commonly of acid pickling the hot-rolled steel, coating with lime, and cold drawing through a die with a reduction in diameter of 1/32 to 1/16 in.) High cutting speeds with long tool life, well-broken-up chips, and smooth, accurate surfaces are indications of desirable machinability. A coarse as-rolled grain structure and the presence of some constituent, such as a sulphide, to break up the continuity of the ferrite, together with low strength and low ductility appear to be desirable for favorable machinability.

Mr. J. D. Armour (Union Drawn Steel Company) states that "carbon up to 0.30 per cent improves machinability, but is deleterious in greater amounts, for which the increased strength offsets the decreased ductility. Manganese and phosphorous increase strength and reduce ductility. If the carbon is under 0.20 per cent, manganese up to 1.5 per cent improves machinability, but when carbon and manganese are raised together, the strength increases and quickly overcomes the factor of reduced ductility, and machinability decreases.

"Phosphorous up to 0.15 per cent improves machinability. High sulphur definitely improves machinability, and the more the better. Large amounts reduce strength and introduce rolling difficulties. In general, lamellar pearlite is the most favorable form for carbon to occur in steels for free machining. When there is too much of it, as in high-carbon steels, the strength is too high for free machining. Spheroidizing to divorce a part of the carbon weakens the steel but improves machinability."

Those metals in bar-stock form which work-harden appreciably often are machined in the hot-rolled condition. Other metals also are made free machining by introducing certain elements. The machinability of yellow brass is improved greatly by the addition of 3 per cent lead. The new free-machining aluminum alloy designated as 11S by the Aluminum Company of America and recently introduced, has very favorable machining properties. Free-cutting aluminum alloys contain tin, lead, antimony, and bismuth added singly or

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together to produce free-cutting well broken-up chips. Aluminum-magnesium alloys have been rendered free-cutting by special heat treatments and additions of chromium and titanium.

Tool Materials

The cutting tool materials now used consist chiefly of the following types:

1) Carbon tool steels—small drills and threading dies for brass, copper, and softer alloys or tools for low production.
2) Carbon - vanadium (and/or Cr) — shock tools, taps, broaches.
3) Low-tungsten steels — for good finishing, reamers.
4) High-speed steel — general purpose production tools.
   14-4-1 } —difficult to harden—gen-
   14-4-2 } eral purpose tools, but not used extensively.
   14-4-2-5 Co.—toughest
   18-4-1—most general purpose tool material.
   18-4-2—brittle—for finishing tools, broaches,and roughing alloy steels heat treated to 380 Brinell. Used generally by Ford Motor Company.
   18-4-4—form tools and heavy duty work.
   18-4-1-4 Co.—high speed—good finish.
   18-4-1-8 Co. } —Warm up first—
   18-4-1-12 Co. } heavy duty and roughing where high red hardness is required.
   Molybdenum high-speed steel, 8 Mo., 1.75 W., 4 Cr., 1 Va.—cheaper and tougher.
   8-4-1-1.5 Co. equiv. to 18-4-1.
   8-4-2 equiv. to 18-4-1.
   8-4-1-1.5 W-4 Co. equiv. to 18-4-1-4.
5) Cyanided high-speed steel tools.
6) Stellite (J-Metal) — roughing operation on cast iron and some steel and shock operations and limited production.
7) Crobalt—similar to Stellite. Used on iron and steel in production.
8) 548 (Iron, Cobalt, and Tungsten—apparently not used.
9) Nitrided tools — hard surface for light cuts. Reamers show increased life.
10) Chromium-plated steel tools — have given excellent results in drilling, tapping, reaming.
11) Cemented-tungsten carbide — rough and finish cast iron, Bakelite, and abrasive metals — long life, high speed, accuracy, and good finish.
12) Cemented - tungsten - tantalum carbide, various grades — used for high speed and long life on steel.
13) Tantalum carbide — for high-speed turning steel.
14) Titanium carbide — for steel, very high speeds.
15) Diamonds—keen cutting edges—very hard—used for high-speed finishing cuts.

Each of these materials has its peculiar field of adaptation, depending upon the material being cut, the type of operation, and the quantity of production involved.

Tool quality depends upon

(1) Composition; (2) Melting and casting practice (or sintering); (3) Method of fabrication (solid ground, solid forged, tipped, bits for holders, or cast); (4) Heat treatment; (5) Metallographic structure; (6) Physical properties, such as hardness, ductility, and hot hardness; (7) Tool size; (8) Tool form, back- and side-rake angles, side-cutting-edge angle, nose radius, relief; (9) Sharpness and smoothness, and (10) Tool setting, i.e., its position with respect to the work.

The failure of tools in continuous cutting may be the result of

1. Abrasion on the flank below the active cutting edge as when carbon steel, high-speed steel, or cemented-carbide tools are turning cast iron, and as when carbon steel tools are turning steel;

2. The development by abrasion of a groove on the face behind the cutting edge. The groove wears forward to the cutting edge, resulting in a sudden breaking off of the edge;

3. A combination of flank wear and grooving, as when high-speed steel tools are turning monel metal;

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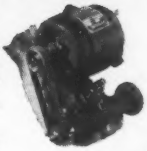

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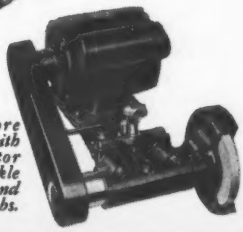

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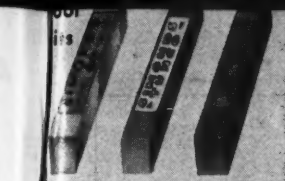
4. Spalling or crumbling of the cutting edge as when cutting extremely hard materials, and

5. The wiping off of the cutting edge due to the loss of hardness because of excessive heat generated at

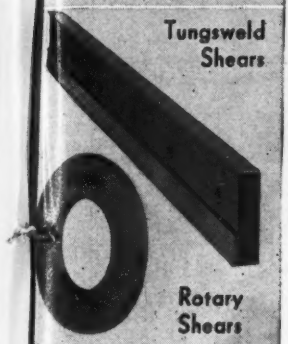
TABLE 1

A summary of experimental results as represented by cutting-speed tool-life equations when turning S.A.E. 3140 steel annealed with high-speed steel tools of the form 8-22-6-6-6-15-3/64, with various cutting fluids at different combinations of feed and depth. The cubic inches removed per grind for a 100-minute tool life are shown also for the various cuts and cutting fluids. $VT^n = C$, in which V = cutting speed in f.p.m., and T = tool life in minutes.

Cutting Fluid	Depth of Cut in In.	Feed in In. Per Rev.	n	C, or Cutting Speed for 1-Min. Tool Life	100-Minute Tool Life	
					Cutting Speed	Cubic In. per Grind
Dry	0.100	0.0125	0.147	143.0	72.5	108.8
EmF 1:50	"	"	0.125	159.0	89.5	134.2
EmF 1:15	"	"	0.130	160.0	88.0	132.0
EMD 1:50	"	"	0.130	162.0	89.0	133.5
SM	"	"	0.142	165.0	86.0	129.0
SB	"	"	0.152	175.0	87.0	130.5
Dry	0.050	0.025	0.133	111.0	60.0	90.0
EmF 1:50	"	"	0.105	117.5	72.5	108.8
EmF 1:15	"	"	0.104	113.0	70.0	105.0
EMD 1.50	"	"	0.097	119.0	76.0	114.0
SM	"	"	0.113	115.0	68.5	102.8
Dry	0.0125	0.0125	0.125	313.0	176.0	33.0
	0.035	"	0.111	200.0	120.0	63.0
	0.100	"	0.147	143.0	72.5	108.8
	0.200	"	0.110	117.5	71.0	213.0
EmF 1:50	0.0125	0.0125	0.115	330.0	194.0	36.4
	0.035	"	0.113	212.0	126.0	66.1
	0.100	"	0.125	159.0	89.5	134.2
	0.200	"	0.107	150.0	91.5	274.0
SB 1:8	0.0125	0.0125	0.127	346.0	193.0	36.2
	0.035	"	0.130	226.0	124.0	65.1
	0.100	"	0.152	175.0	87.0	130.5
	0.200	"	0.133	152.0	82.5	247.5
Dry	0.200	0.0125	0.110	117.5	71.0	213.0
	"	0.025	0.128	74.0	41.0	246.0
	"	0.050	0.140	46.7	24.5	288.0
EmF 1:50	0.200	0.0125	0.107	150.0	91.5	274.0
	"	0.025	0.097	90.0	57.5	345.0
SB 1:8	0.200	0.0125	0.132	152.0	82.5	247.5
	"	0.025	0.103	90.0	55.8	335.0

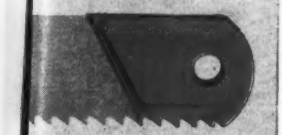


Tungsweld Shears



Rotary Shears

HACK SAWS



High Speed Steel—Bright

Molybdenum Steel—Red

Tungsten Steel—Black

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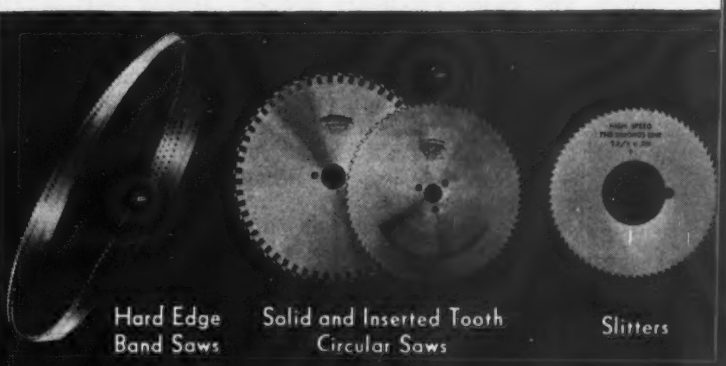

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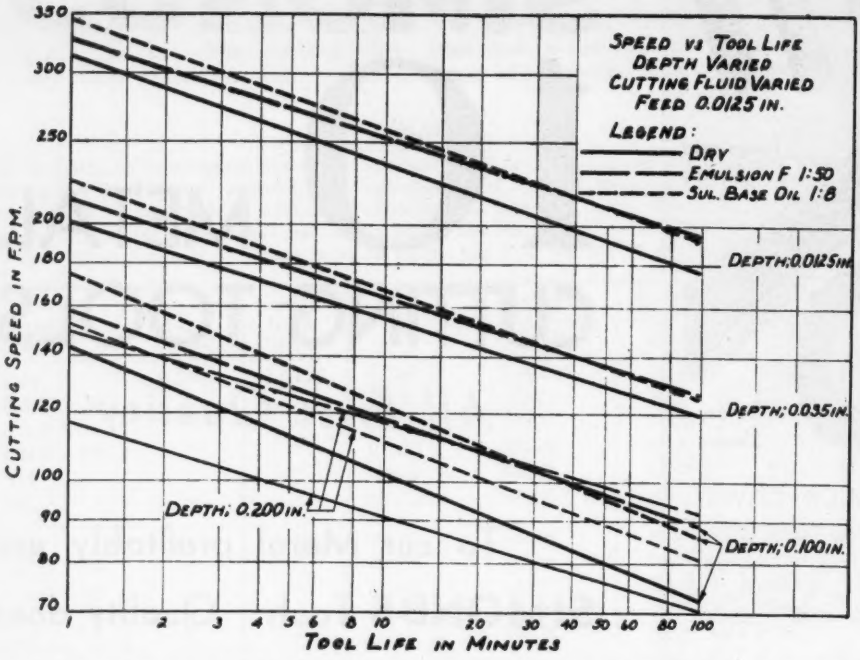

Fig. 3—Normal forces plotted on Cartesian Co-ordinates over the depth of the cut in inches, using a 25-deg. L. H. helix slab mill 3 in. in diameter, having 12 teeth, operating at a speed of 17 r.p.m. (13.3 f.p.m.) when cutting annealed S.A.E. 3150 steel at various feeds and depths with a sulphurized mineral-lard oil. Width of cut, 2 inches.

the cutting edge.

Tool shape influences the constants and exponents in the cutting force and the tool-life equations. Deep, thin chips take higher power, but give longer tool life.

Cutting Fluids

Cutting fluids comprise liquids, solids, and gases which are applied to the tool point to facilitate the cutting operation by cooling and lubricating. They may be used to accomplish any one or any combination of factors, such as increase the tool life, prevent distortion of the work, reduce power consumption, break up chips and help to remove them, and at low speeds and light cuts may improve the smoothness of the machined surface.

The cutting fluids most commonly used are:

1. Water containing an alkali;
2. Emulsions of soluble oils or pastes; and
3. Oils, such as mineral, fixed, compounded, and sulphurized.

In general, dry cutting with air suction or blast is used on cast iron and on job shop work. Both water containing an alkali (such as tri-sodium phosphate or borax) and emulsions are used on grinders and in drilling. Emulsions (1-5 and 1-30) are used on most roughing production jobs involving practically all metals. Their use on automatics, and on millers, gear cutters, turret lathes, and drill-

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ing machines is being extended. Sulphurized oils are used on machines requiring lubrication and on highly ductile metals.

Base oils, when blended with from four to fifteen parts of light mineral oil, are used on gear generators and screw machines, including automatics turning and threading are involved. With little blending they are used on gear-cutting machines, for broaching, pipe threading, and so on. The straight sulphurized oil seems to be the best all-around oil for use on the very tough steels, including stainless steel and threading copper, monel, and so on, where good surface finish is desired.

Surface Finish

The finish is improved as the built-up edge on the tool face is reduced in size. This is accomplished by singly or collectively increasing the rake of the tool, increasing the speed, reducing the size of cut, or by introducing a cutting fluid. Standards of surface finish and practical methods of measuring them are needed urgently. The profilograph and profilometer are two devices now available for this purpose.

Commercial Practice

In order to secure at the least unit cost the greatest production of a part having definite analysis, structure, and physical properties, the cutting tool should be of a suitable material of a certain definite quality and geometric shape as determined by its profile of cutting edge and combination of angles. The cutting fluid should have properties best suited to obtain the highest rate of production, the best surface finish, or the most convenient chip form for disposal.

If the physical properties of the metal cut are changed, or if another metal is substituted, some of the factors of the tool, cutting fluid, or mechanical equipment also should be changed to maintain optimum cutting conditions. The present state of the art of metal cutting leaves the selection of these various factors for each problem to be determined largely by empirical methods.

Tabulated data of this type, as obtained from commercial practice, are published frequently in trade journals. Laboratory research is simultaneously providing fundamental information which helps to explain the phenomena of metal cutting and to assist in raising the art of metal cutting to a science.

Brazing Cemented Carbide Tool Tips. A bulletin explaining in detail the correct procedure in brazing cemented carbide tool tips with Easy-Flo No. 3 Brazing Alloy has been published by Handy & Harman, 82 Fulton St., New York, N. Y., manufacturers of the brazing alloy. Copy free upon request.

Spring Convention of Machine Tool Dealers To Be Held at Schenectady June 5th and 6th

For the first time in its history, the Associated Machine Tool Dealers of America are holding one of their National Conventions in the City of Schenectady, N. Y. Announcement has been made that this meeting will consist of a two-day session, June 5th, and 6th, with headquarters at the Van Curler Hotel, Schenectady.

Several outstanding speakers are included in the program and valuable inspection trips are also in prospect.

It is anticipated that many of the members from distant points will include a visit to the New York Fair in their itinerary when attending the Convention.

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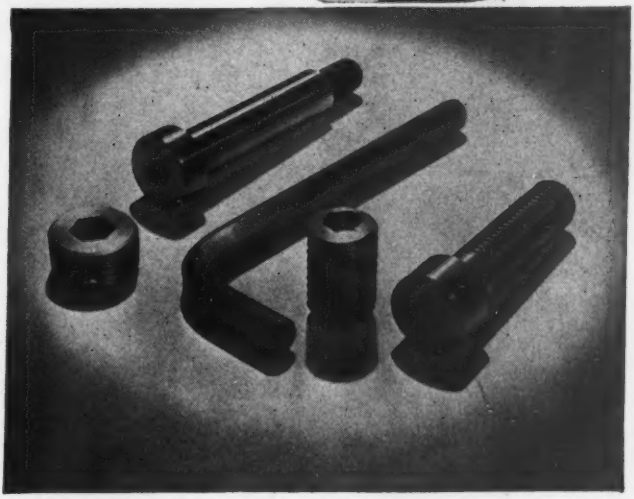

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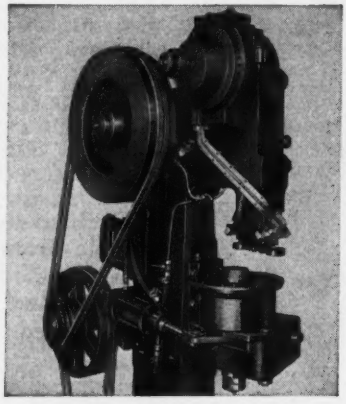

The Rivitor is shown here setting two solid rivets at one time to attach cushion springs to driven clutch plate assemblies.

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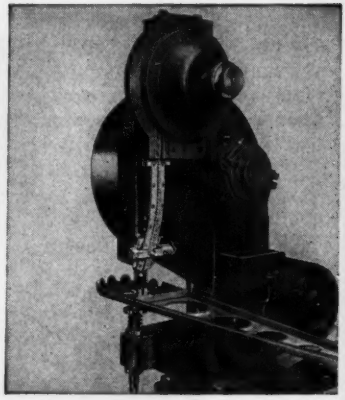

This is the standard "BR" Bench Type Rivitor tooled for setting ⅛" diameter x ¼" long duralumin rivets in airplane sections.

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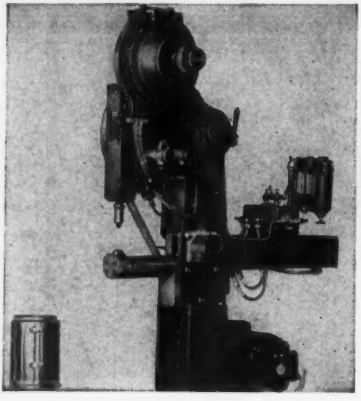

The Rivitor is shown here setting aluminum rivets to attach handle brackets to bodies of percolators.

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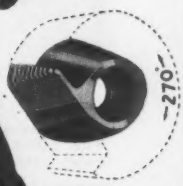

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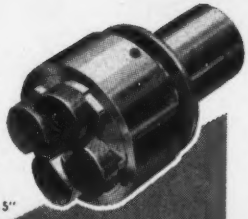

Above—stationary type

Right—revolving type. Both simple, strong, easy to adjust—stay accurate. Chasers are interchangeable. Capacities .056" to 5"

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Modern Method of Fabrication Meets General Need

By R. A. GAST
Mechanical Engineer,
The Lincoln Electric Company.

TEN years ago things would have been different! . . . a scramble for the old pattern from which the broken part was made . . . repairing or conditioning of the pattern . . . delivering the pattern to foundry . . . recasting the part . . . machining the casting . . . then (after a lot of delay), installation of the part and, finally, restoration of the machine to operation.

In this year of 1939, the picture (enacted in a modern machine shop like the one where the accompanying photos were taken) shows no scrambling for the old pattern, no pattern repairing or conditioning, no recasting of the part which broke, no complicated machining. Instead, the picture shows the shop making a new part in the simplest possible manner — merely by cutting steel into pieces of the proper sizes and shapes and fusing the pieces together into one

Fig. 1—Broken cast steel crosshead (left) of 20-year-old drag saw and (right) the welded parts which replaced it.

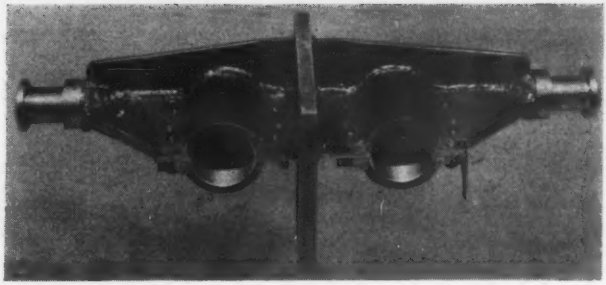

Fig. 2—Close-up of main part of fabricated crosshead showing welded construction.

single unit to form the replacement part.

What accounts for the difference? A new process of joining metals which is rapidly becoming a most important piece of equipment in the modern machine shop's kit of tools. We refer to electric arc welding.

As an example of what the machine shop of today is doing with arc welding, take the case of the steel casting forming the crosshead of a 20-year-old drag saw at the Asplin Basket Works, Cleveland, Ohio. The casting broke and the pattern was missing and could not be found.

The shop foreman, having had previous experience with arc welded steel in fabricating less complicated parts, worked out a design for welded construction. The design consisted of little more than dimensions to indicate sizes and locations of parts.

The illustration Fig. 1 shows (at left) the old broken steel casting and (at right) the new welded replacement parts. Not shown in the photo

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Fig. 3—Same as Fig. 2, but from different angle.

is the plate connecting the two welded parts of the crosshead. These are the parts at the rear and center. Closer examination of the welded parts shows that they are made of standard steel plate and shapes.

The part shown in Fig. 2 is made from plate, tubing and round stock. This part, which is the principal section of the crosshead, is 29½ in. wide overall. The plate, at center, is 8¾ in. square by ¾ in. thick, and the longitudinal plates are also ¾ in. thick. The bearing bosses are pieces of 4-in. tubing, with journals at each end of round stock. Altogether, there are 19 pieces of steel arc welded together. Further details of the construction can be seen in Fig. 3.

The smaller part of the crosshead, shown in Fig. 4, is intended to provide the necessary stiffness against the thrust of the saw, and is simply the longer part (Figs. 2 and 3) duplicated without the extensions beyond the bearings. The overall width

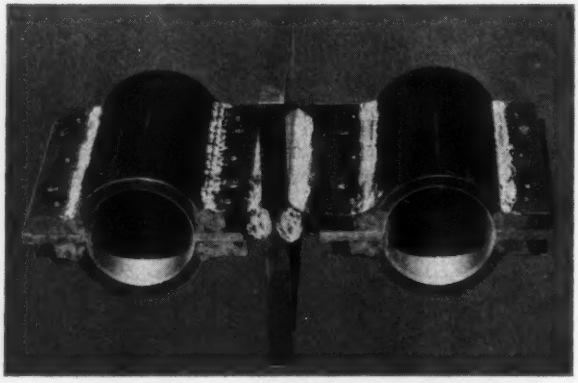

Fig. 4—Smaller part of crosshead. This part and Fig. 2, connected together by plate, make the complete crosshead.

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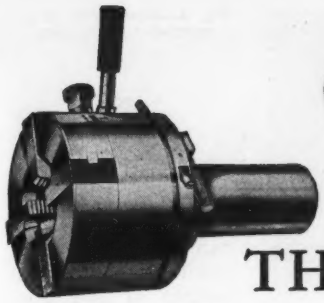

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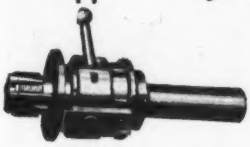

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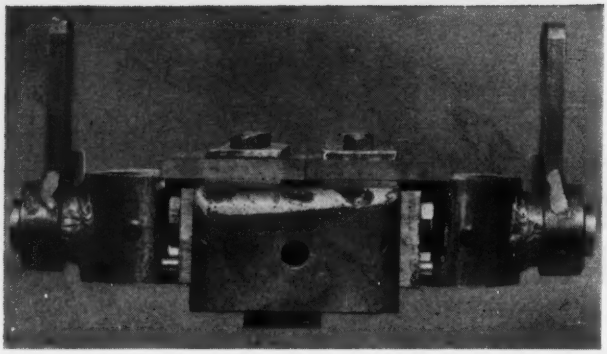

Fig. 5—Saw guide of arc welded construction.

of this section is 15 inches.

Shown in Fig. 5 is the welded part which guides the saw. This piece is 16⅛ in. overall width and is made up of two 3 x 3 x ½-in. angles sliced out in center with a torch and with a piece of steel plate welded into each end. The bearing bosses are 3½ in. (O.D.) tubing.

The three arc welded parts, in approximate operating positions on the saw, can be seen in Fig. 6. At the opposite end of the machine additional stiffness was provided by arc welding at points chalk-marked. All of the welding was done by the shielded-arc process with modern arc-welding equipment.

Rigidity, stiffness and accuracy of construction were required in these fabricated parts. This can be appreciated from the size and weight of the saw, which is of 8-gauge metal, 7 ft. long, and 10 ft. wide.

The weight is 45 pounds. This weight, plus the leverage, subjects the parts to heavy working stresses. Maximum rigidity and stiffness were provided by use of arc welded steel.

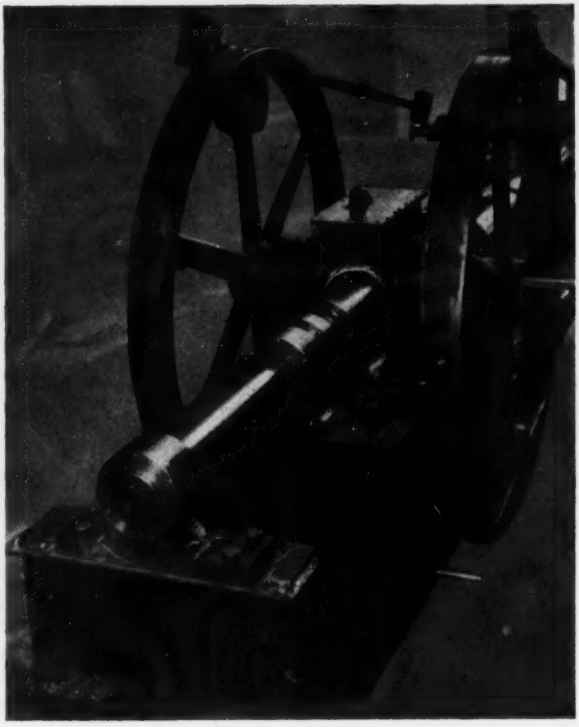

Fig. 6—Use of arc welding to stiffen frame of saw. Welds shown by chalk marks.

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Greatest possible accuracy was obtained by exercising care in welding the various pieces together and in machining to required tolerances. The structural properties obtained, plus the savings in time through elimination of pattern making and savings in cost through use of rolled steel, indicates why arc welding is gaining favor with machine shops. It helps them to do better work and to save money at the same time.

(Photos Courtesy The Lincoln Electric Company, Cleveland, Ohio.)

Reed Standard Stock Knurls covering a wide range of pitches and sizes of holders and pins are described and illustrated in a ten-page bulletin now being distributed by Reed Small Tool Works, 40 Dewey St., Worcester, Mass. Specifications are given for the various sizes; special knurls can be supplied on special order.

Copy free upon request.

Ramsey Mechanical Power Transmission Equipment is the subject of a 40-page booklet, designated as Catalog 638, recently published by Ramsey Chain Company, Inc., Albany, N. Y. Particular emphasis is placed on the high speeds of typical installations of Ramsey equipment shown in the book. Copy free upon request.

"Ideal" Products. A circular published by Ideal Commuator Dresser Co., 1031 Park Ave., Sycamore, Ill., is devoted to a number of "Ideal" products used in motor and generator maintenance, including a commutator resurfacer, brush seater, portable precision grinder, circular saws and milling cutters, universal power mica undercutter, hand type slotter and scraper, slotting files, slot scrapers, and commutator cement. Copy free upon request.

Porter Hand-Operated Cutters. H. K. Porter, Inc., Everett, Mass., announces a new catalog which is replete with illustrations of tools, parts and actual on-the-job performances. The booklet is the most comprehensive publication ever compiled on the Porter line of hand-operated cutters. It contains not only complete information on the line, but also serves as a reliable handbook on what tools to choose and use for any cutting problem. Copy free

"Ideal" Thermo-Grips, electric soldering tools manufactured by Ideal Commutator Dresser Co., 1031 Park Ave., Sycamore, Ill., are the subject of a folder now being distributed. The various types of Thermo-Grips are illustrated and described. Copy free.

Roto Shaving, an application of special milling cutters to the problem of finishing metal surfaces, is said, for precision, to be equivalent to production grinding, although lower in cost. Roto Shaving is performed on the Red Ring Roto Shaving Machine, product of the National Broach & Machine Co., Shoemaker and St. Jean Sts., Detroit, Mich. Complete details are given in a six-page circular, copy of which is free upon request.

"A New Source of Heat for Heat Treating, Brazing and Melting" is the title of a 28-page spiral bound catalog now being issued by Lepel High Frequency Laboratories, Inc., 39 W. 60th St., New York, N. Y., which discusses high frequency current and its use in heat treating metals.

Included in the catalog are illustrations showing Lepel high frequency induction heating equipment and the applications for which this equipment is used. Copy free to any plant executive.

Thor Drillmaster. This 12-page booklet presents a ¼-in. portable electric drill, to be known as the "Thor Drillmaster," which has been introduced by Independent Pneumatic Tool Company, 600 W. Jackson Blvd., Chicago, Ill. An interesting feature of the booklet is a "Question and Answer" section devoted to information on the drill. Copy free upon request.

Parkerizing. An attractive 24-page booklet presenting the features and advantages of the Parkerizing Process of rust proofing has been published by Parker Rust Proof Company, 2172 E. Milwaukee Ave., Detroit, Mich. The booklet is divided into sections, each section being devoted to a particular phase of the process. Subjects discussed include the Advantages of Parkerizing, Parkerizing Installation, Types of Products on Which Parkerizing Is Used, the Salt Spray Test, Parker Engineering and Laboratory Service, and a list of jobbing plants where Parker Processing Service is available.

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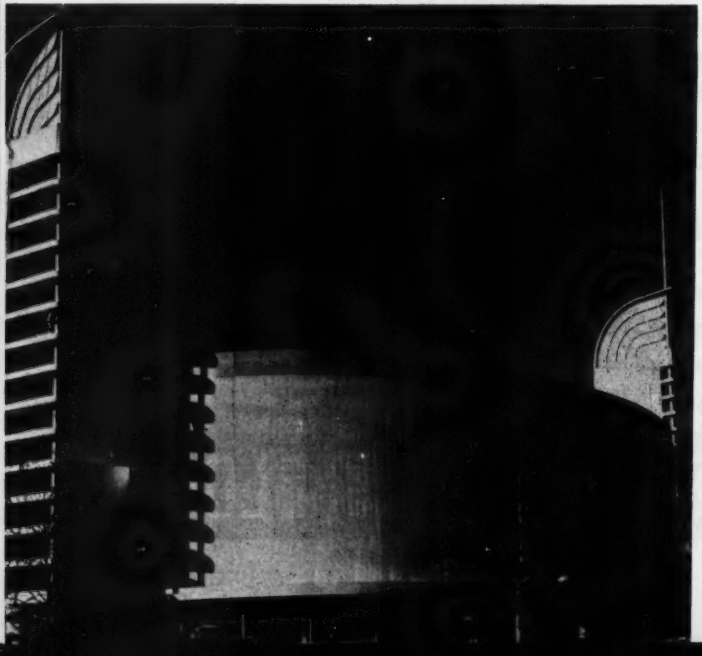
CJB PILLOW BLOCKS

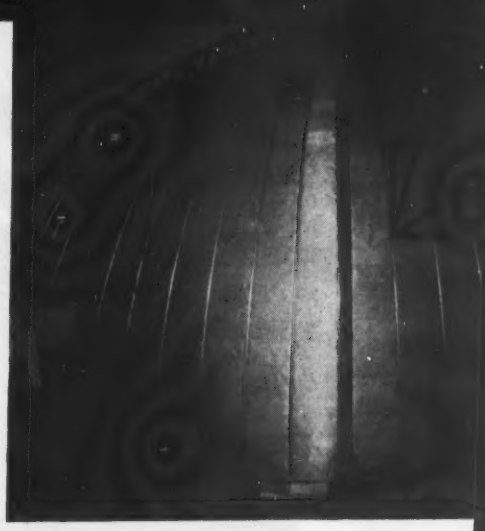
Erected by the motor car manufacturer whose name it bears, this building will house not only an assortment of manufacturing equipment in operation so that the visitor may see what an automobile factory looks like on the inside, but will also contain a half-mile "Road of Tomorrow." Walter Dorwin Teague was the designer.

Metal Manufacturing Exhibits at the New York World's Fair



This building, which will house the Chrysler Corporation's exhibit at the Exposition, occupies a three-acre plot on the west side of the transportation zone between two of the Fair's main entrances. The building will also contain the Transportation Focal Exhibit featuring a simulated departure of a rocketship for an interplanetary rocketport.

Normal construction practice is reversed in this building, which was erected by the United States Steel Corporation. Structural members are on the outside, with walls and roof underneath. Workmen have recently completed sheathing the dome of the building in stainless steel.



The General Motors exhibit building, illustrated below, was designed by Norman Bel Geddes — world-famous designer — to present the displays of the various units in the Corporation. To be known as "Highways and Horizons" and in keeping with the World's Fair theme of "Building the World of Tomorrow," the exhibit will present a conception of future motor traffic regulations and super-highways.

By means of a continuous escalator, visitors seated in comfortable, moving chairs will travel over the superhighways and into the "city of tomorrow." The tour will be climaxed by a full-size street intersection showing the architecture, motor traffic, and pedestrian facilities of the future.

A night view of the Metals Building at the New York World's Fair. Note the glass brick background for the fountain and, at the right, the unusual light standards.

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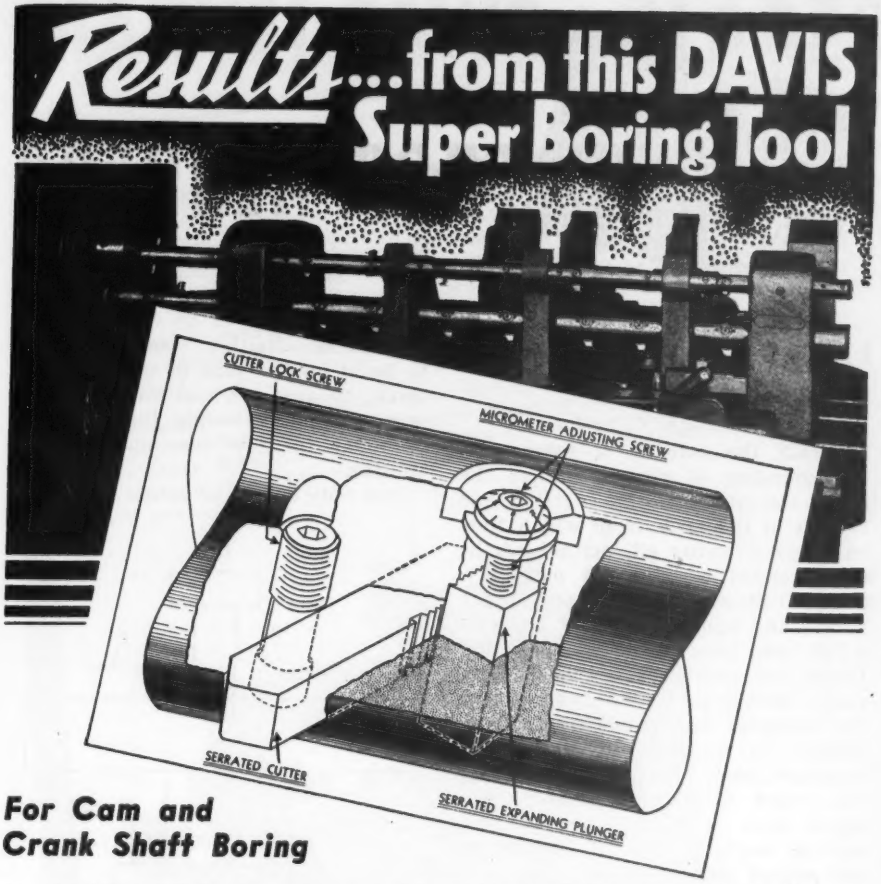

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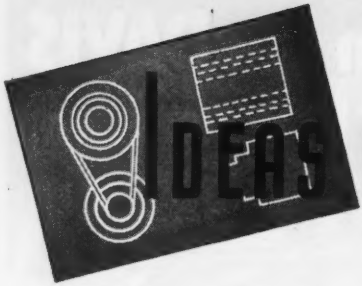

IDEAS FROM READERS

Using Dynamite to Remove Crankpins

By CHARLES C. LYNDE

WHEN the rattling of valves and pounding of pumps warned the pump station crew that suction had broken in the tank from which they had been drawing oil, neither of the men stopped to open the pump by-passes before to hurrying to switch valves and admit a head of oil from a full tank into the intake manifolds. Under the sudden surge of oil, the pump barrels partly filled, subjecting the plungers and entire pump drive system to a series of tremendous hammer blows which continued until the voids filled and pressure had again been established at the line's normal working pressure of 800 lbs. per square inch.

Almost immediately the pump bearings became hot, thus indicating damaged crankpins and, upon shutting down a unit, the pins were found to be bent at the point where they entered the crank throw.

One of the gears of the pump, together with its shaft and crank, was removed and attempts were made to drive out the pins by using a sledge and bar, but without success. Since replacement pins were no closer than several hundred miles away, it was unfeasible to drill or burn out the old pins, nor was there any bar stock on hand from which new pins could be turned. Neither was it possible to build up the pins in place with a torch, because we had no equipment large enough to swing the assembly in order to turn the built-up pins to size.

Our only course of action lay in removing the old pins, with no press available of sufficient capacity to admit the throw or of sufficient pressure to force the pins from their fits. We were put to the necessity of employing the only force available at the moment—dynamite.

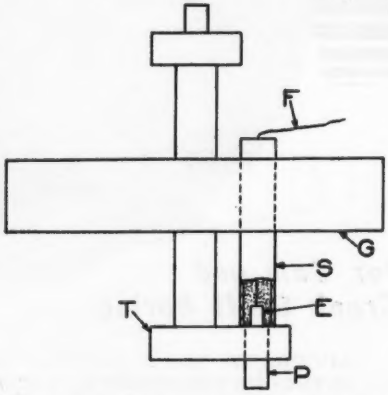

Diagram Illustrating Use of Dynamite to Remove Bent Crankpins

As illustrated in the drawing, we blocked up the gear, indicated at G, in a horizontal position with the lower throw firmly supported. A

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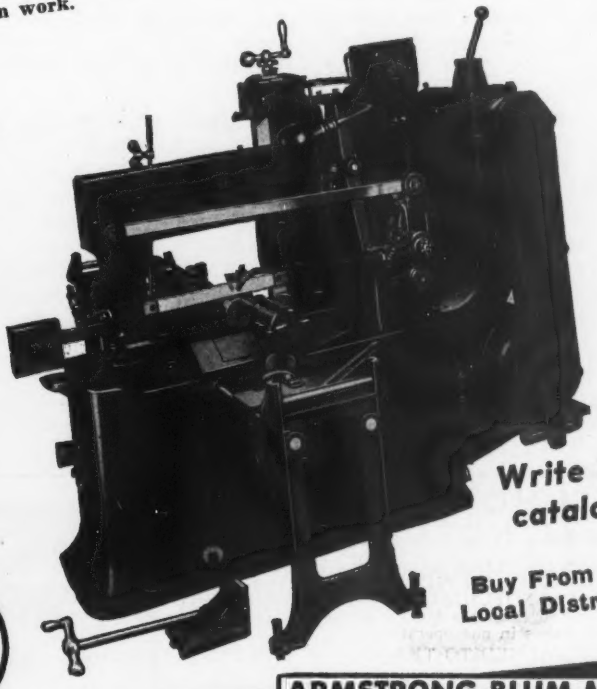
The MARVEL 6A or 9A heavy duty all-ball-bearing Hack Saws with automatic bar push-up are the fastest hack saws built. In cutting-off identical pieces from bars, they are unequalled, floor to floor, by any other cutting-off machine tool of comparable accuracy . . . unequalled either in speed (out-put) or labor cost (they require no more attention than an automatic screw machine).

Automatic production can be interrupted at any time for single-cut or miscellaneous work by simply dropping off the bar-feed belt; hence MARVEL Automatic Saws are fully multi-purpose, are always ready for either automatic quantity production or plain work.



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short gun barrel, S, was made from two discarded drill pipe substitutes which, when screwed together, formed a tube approximately 33 in. long with a 6⅝-in. diameter and having a 4-in. hole at the base. This "barrel" weighed approximately 400 pounds.

The barrel was carefully centered over the inside end of the pin P, standing flush with the level upper surface of the crank-throw T, upon which had been placed a charge of dynamite with a 3-yard length of slow fuse attached. To prevent the explosion from shifting, it was anchored to the end of the pin by a small collar of plastic gasket material.

With the heavy barrel in place, it was poured full of sand and an oak plug, in which a hole had been drilled to carry the fuse, was screwed into the end of the pipe. Then, standing a heavy oak plank between the barrel and the upper crank-throw to shield the upper throw against possible damage from the barrel, the fuse was lighted and everybody scattered.

After the roar of the explosion had died away, it was found that the pin had been driven from the throw and embedded in the clay floor to a depth of almost two feet. Neither pin nor throw showed any signs of damage.

The explosive charge consisted of three-fourths of a stick of 60 per cent dynamite, the amount used being cut into three equal lengths, tied together and placed on end with the detonating cap in the center. The second pin was removed in the same manner as the first. Metal was added to the pins with a welding torch and the pins were turned to size, then driven back into place.

An Economical Punch and Die

By J. E. Moore

SEVERAL hundred strips of zinc were to be cut and punched, 10 holes each, as shown at F in the drawing. The job was wanted quickly and, inasmuch as it was a comparatively simple job, it was necessary that the tool-cost be kept to the minimum.

A block of steel was squared as shown at A, then 10 holes were drilled in a row, equally spaced to conform to the design, and through the block. Ten pieces of drill rod were then cut to a length so that when inserted into the holes in the block with the lower end of the piece flush with the bottom of the block, the upper end would project ⅝ inch.

A section of pipe B was placed on the block so that the ends of the rods were enclosed as shown at B. Sand

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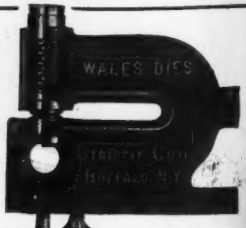

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THE STRIPPIT CORPORATION

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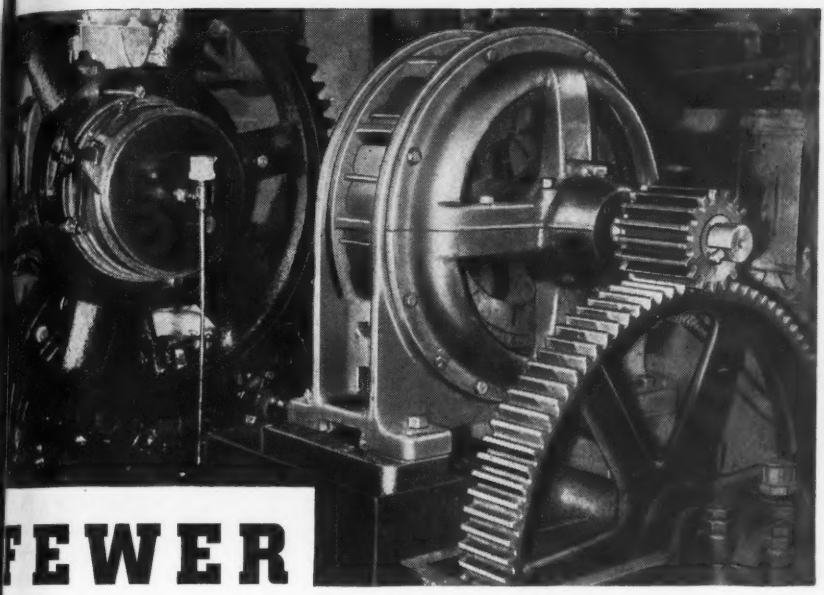

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Because they are nonmetallic and contain a high degree of resilience, Fabroil gears are extra-quiet and cushion the shock of heavy machinery. This helps reduce vibration to the minimum and at the same time increases the life of your machine.

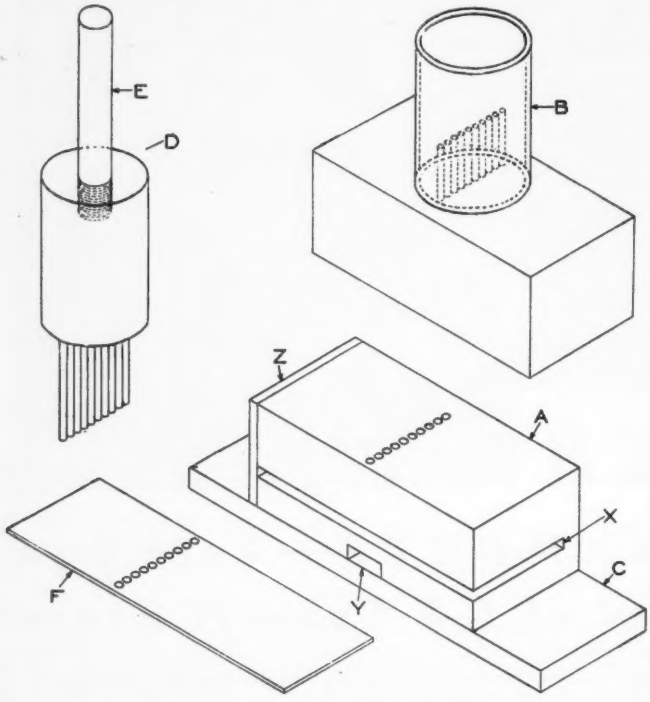
Write your nearest Fabroil gear distributor listed in Thomas' Register, or to Section H-49, Plastics Dept., General Electric Co., Pittsfield, Mass.

GENERAL ELECTRIC

PD-33D1

was then packed around both the block **A** and the pipe **B**, and the pipe was filled with molten aluminum. When cool, the pipe was removed from the aluminum casting and the casting, indicated at **D**, was drilled and tapped for the shank **E**. The punch was ready for use.

To complete the die, the slots **X** and **Y** were milled in the block **A** and the block was bolted to the plate **C**, then the plate **Z** was attached to the end of the block as shown to serve as a stop for the stock.



Design of Economical Die for Punching Zinc Strips

The punch and die were lined and clamped in a hand press for operation, and the stroke of the press was adjusted so that the small rods would not quite clear the top surface of the die. The work-pieces were fed into the slot **X** to the stop-plate **Z**, at which point the punching operation was performed. Slugs were expelled through the slot **Y**. Although of simple construction, the die served the purpose and was still in good condition at end of job.

KELLY

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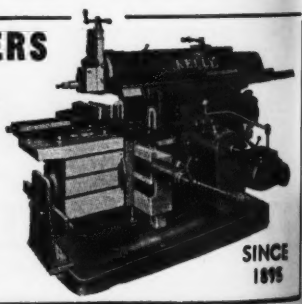

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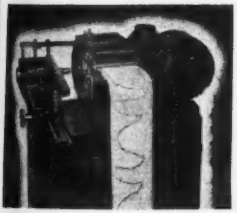
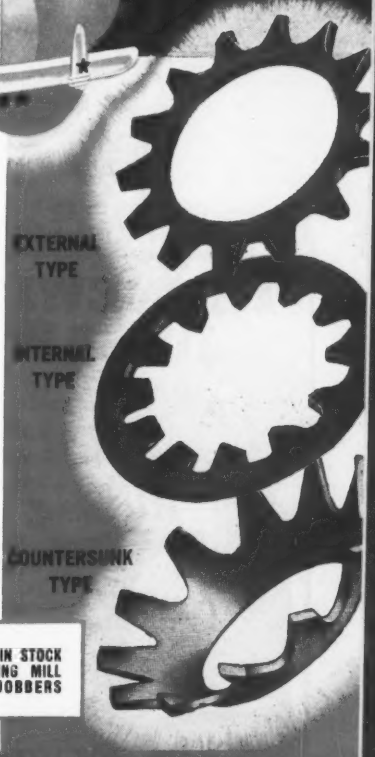


Graphic evidence of Shakeproof's locking efficiency is given by the Maximeter, a laboratory instrument that automatically records the torque force values required to tighten and loosen nuts and screws. Tests prove that more force is required to loosen a Shakeproof connection after being subjected to vibration than was originally needed to tighten it.



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Self-Locking Set Screws—Locking and Plain Terminals—Spring Washers—Special Stampings

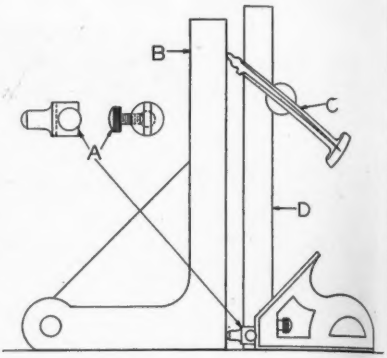
An Inspection Device

By PETER L. BUDWITZ

THE drawing illustrates how a combination square can be used to hasten the inspection of parts for squareness.

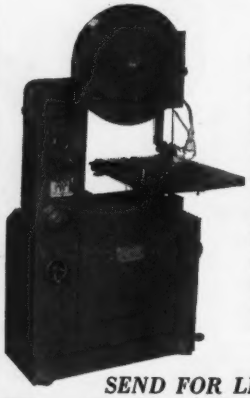
The device consists of the test indicator **C** and the part **A**, both of which are employed to form the gaging points of the device. The part **A** has a slot cut into it to fit the blade of the square **D**. A hole is drilled and tapped in one side of **A** to receive a thumb screw for the purpose of fastening the part to the blade of the square. When the contact point **A** is attached to the blade, one end should butt squarely against the base of the square. A master square is used to set the device, the indicator **C** being set to read zero.

In use, the work **B** to be inspected is placed on a surface plate and the inspection device brought in contact with it at the contact point and indicator. If any inaccuracies are present, they will be readily shown on the scale of the indicator **C**.



Drawing of Inspection Device

TANNEWITZ DI-SAW



For inside and outside band sawing, filing, and polishing on dies, shoes, templets, and endless other jobs. A decided labor saver. A sturdy machine of ample capacity.

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The Tannewitz Works

Grand Rapids • Michigan

"Hold-Downs" for Clamping Tapering Work

By JOHN W. GERDEL

A NUMBER of castings of the shape shown at **C** were to be planed on both top and bottom. Difficulty was experienced in holding the workpieces, however, due to the fact that the sides tapered between two and ten degrees from top to bottom. An attempt to hold the pieces by clamping them at the ends failed because they tended to bend under pressure.

The problem was finally solved by making "hold-downs" from a cast iron disc, which was cut in halves and each half machined as shown at **A**. In use, the hold-downs are placed between the sides of the workpiece

Saved.. SIGHT..JOB..MONEY
by "Greenfield" Gages

Aging eyes could no longer read micrometer measurements of .0002"—the prescribed tolerance on ground spindle ends. So a *"Greenfield"* gage engineer proposed limit snap gages and appropriate setting plugs to replace the old measuring methods, and saved a job for a faithful worker. The company saved, too, for the new snap gages provided faster and more accurate control of size.

If you want rapid and accurate inspection *"Greenfield"* gage engineers can help you. Even if results are not as dramatic as in this instance, they will be fully as pleasing, financially.

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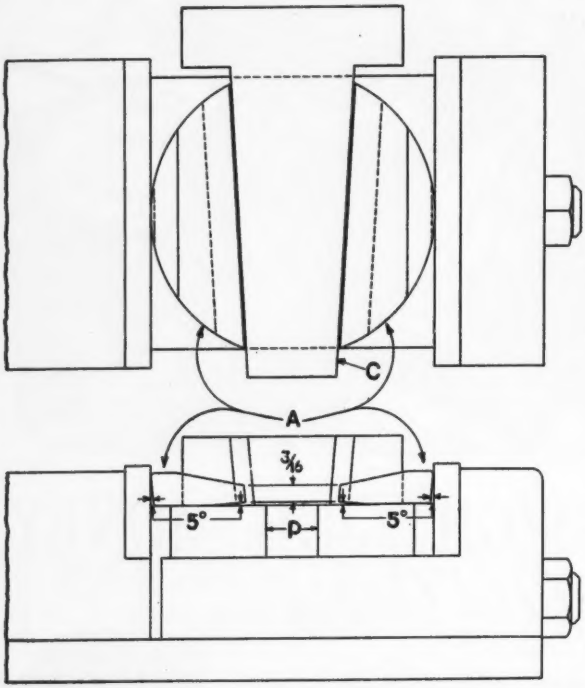
and the jaws of the vise, resting on the parallels **P**. As the vise is tightened against the hold-downs, the five-degree clearance on the sides and under the inner ends of the hold-downs aids in developing a downward pressure on the sides of the work and the workpiece is firmly held while the machining proceeds.



Drawing Showing Use of Hold-Downs for Clamping Tapered Work in a Vise for Machining

Simple Attachment for Lathe Speeds Tapping

By A. H. WAYCHOFF

THE device illustrated in the drawing is a simple attachment designed to aid in tapping on the lathe in cases where it is necessary to use the lathe for this purpose. The attachment consists primarily of the steel parts **A** and **F**, which are hinged together and clamped to the tailstock center. The feature of the device consists in that the tap can be swung up out of the way so that the center can be used for other purposes.

The part **A** is milled at one end to leave the ears **B**, which are drilled with crossholes **O**. Through the center of the piece the hole **C** is drilled and taper-reamed to fit the tailstock center, as shown, then

A good one for DRILL PRESS
Often used on Miller, Shaper, Planer

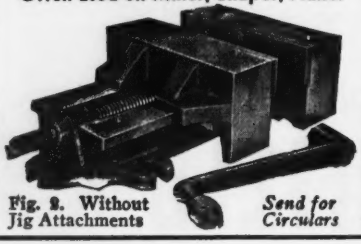


Fig. 2. Without Jig Attachments

Send for Circulars

VISE

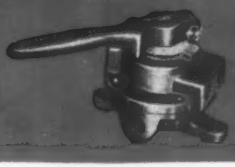
Jaws 6", 9" and 12" Long
Much drilling. Small Jig cost.

Fig. 1 With Jig Attachments

THE GRAHAM MFG. CO.
69 Willard Ave., PROVIDENCE, R. I.

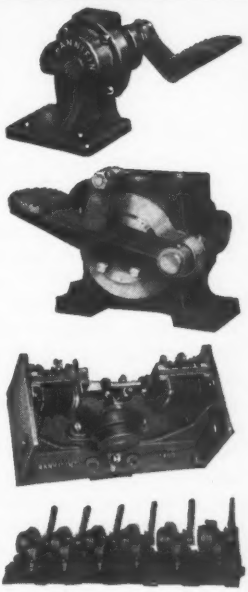
"Pack-less"

DISC-TYPE VALVE DESIGN GIVES POSITIVE CONTROL OF AIR OPERATED EQUIPMENT



Hannifin "Pack-less" air control valves have the simple, perfected disc-type design that provides smooth-acting, positive control of air operated equipment and stops leakage troubles. In these valves the bronze disc controlling air flow is ground and lapped to form a perfect seal with the valve seat, which is similarly finished. There is no packing, and no leakage or packing maintenance troubles.

Hannifin valves are made in 3-way and 4-way types for various standard cycles of operation, for control of single- and double-acting cylinders, for air or hydraulic pressures up to 150 lbs. per square inch. Available in the following models: Standard hand control valves; Duplex valves for control of two double-acting cylinders; Spring return valves for instant reversal upon release of pedal; Foot operated treadle valves; Heavy duty rotary ratchet valves; Electrically operated valves for remote control; Manifold valves for simple control of several units.



WRITE for Valve Bulletin 34-MM with complete descriptions of all types.

HANNIFIN MANUFACTURING COMPANY

621-631 South Kolmar Avenue, Chicago, Illinois

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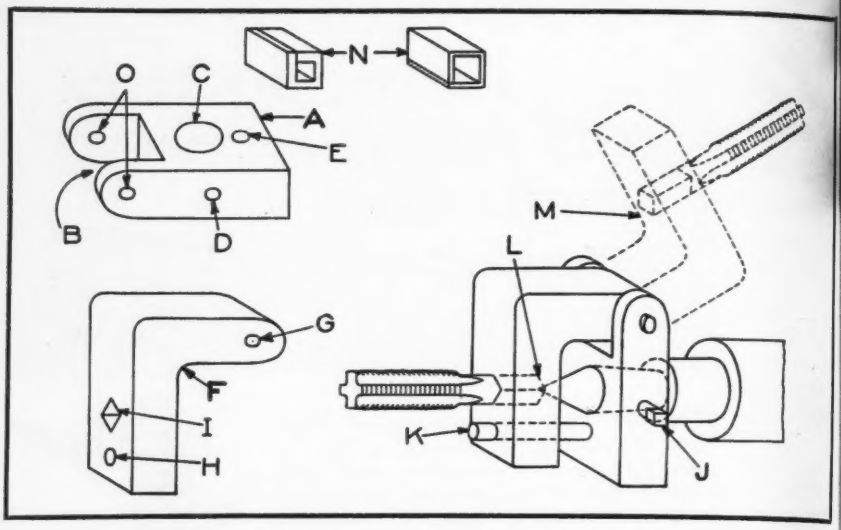
HANNIFIN "Packless" AIR CONTROL VALVES



Design of Simple Attachment to Aid in Tapping in the Engine Lathe

the hole **D** is drilled through the side of the piece and tapped for the set-screw **J**. The part **F** is machined to a right angle, as shown, and milled on the side to make it fit the clearance between the ears **B** in part **A**. To provide for holding the tap, a hole is drilled and filed or machined square as indicated at **I**, care being taken to locate the hole so that when the attachment is assembled to the lathe, the center of the square hole will be in line with the point of the tailstock center. The holes **E** and **H** are also drilled in line so that when ready to use, the push-pin **K** will fit into the holes without binding. The two parts are assembled by inserting a hinge-pin through the holes **O** and **G**, the push-pin **K** being used to keep the arm **F** from swinging up or wobbling.

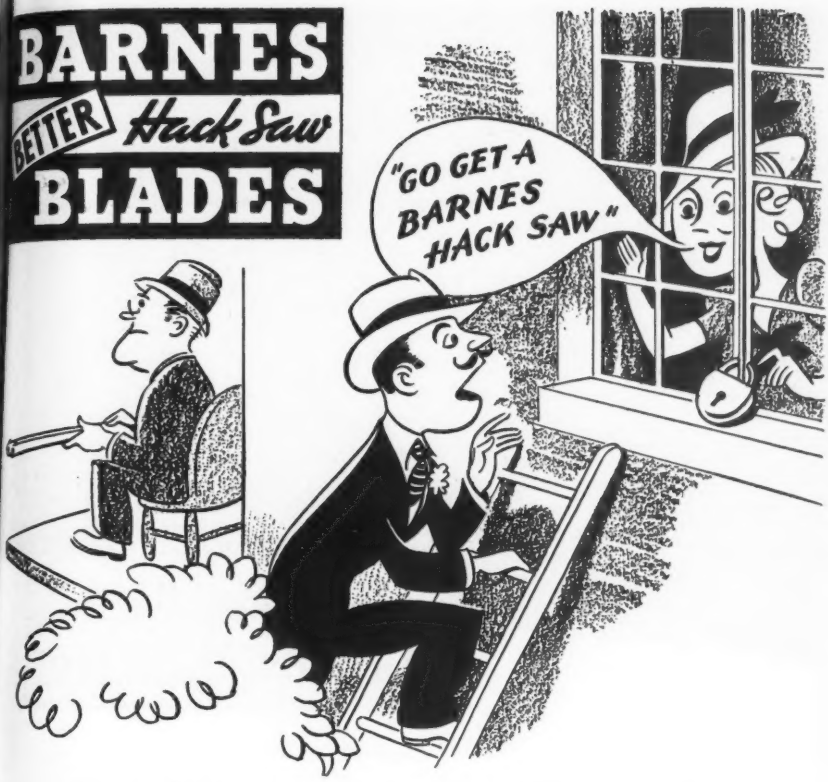
When the tapping operation is completed, the push-pin **K** is removed and the arm **F** is swung back out of the way as shown at **M**.

The hole **I** is made to take the largest size of tap that will be used in the attachment and adapters of the type shown at **N** are used when employing taps having smaller shanks.

"Forging Ahead with Forgings" is the title of a 36-page booklet now being distributed by The Steel Improvement & Forge Co., 960 Addison Rd., Cleveland, Ohio. The booklet contains a fund of valuable information on the subject of forgings, sections being included on typical examples of the benefits available through the use of forgings, suggestions on designing for forgings, suggestions for purchasing forgings, drafting recommendations, preparatory steps for forging processes, finishing operations, data on selection of steels, comparative information on commercial forging metals, reference data on tapers of angles, weights and hardnesses, and temperatures.

The booklet is attractively arranged and numerous photographs supplement the text. Copy free to mechanical executives upon request.

BARNES BETTER Hack Saw BLADES



Barnes Blades bring home the bacon without by-passing the front office or forcing the issue.

Sold strictly on a performance basis, every blade in the Barnes Line (6) is produced to handle a specific set of metal cutting needs.

Band Saws too.

If your regular distributor can't supply you, write to us direct.

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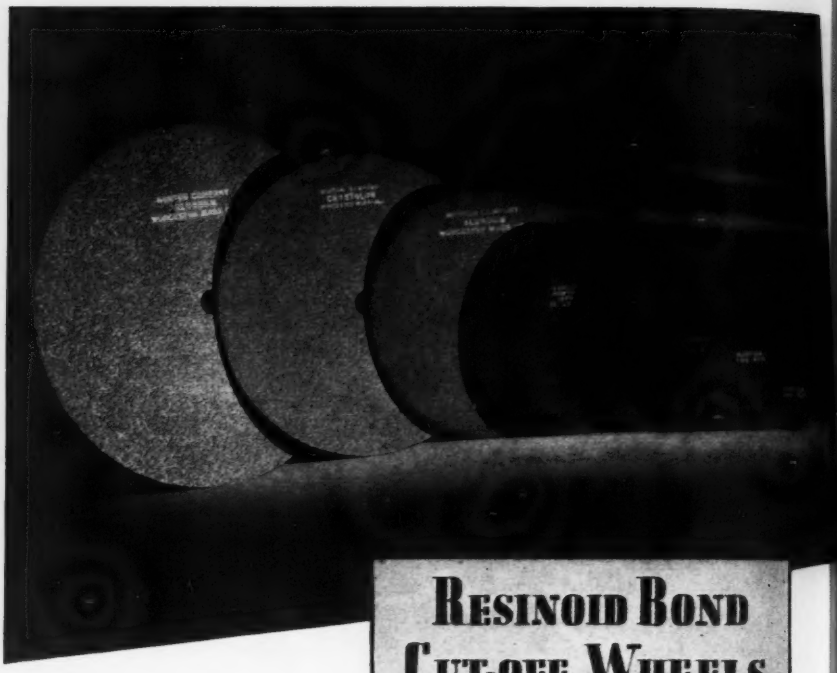

RESINOID BOND CUT-OFF WHEELS

ABRASIVE wheels are now recognized production tools for cutting-off and slotting operations — are doing the job more economically than other methods and leaving a finish that, in many cases, eliminates subsequent operations.

The Norton resinoid bonded wheel has a fast, free cutting action that reduces costs to the very minimum. There is also the Norton rubber bonded wheel — used for many wet cutting-off operations and for jobs where a minimum of burr is desired.

NORT[illegible]PANY
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W-704

NORTON ABRASIVES

"B-E" Bond Tool Wheels

HERE is a wheel that is setting a new record for tool room wheel performance. Users of Norton "B-E" bond wheels report that they are able to get extra production and longer wheel life without sacrifice of cutting speed and without the danger of burning the most heat-sensitive tool steels.

Try this "B-E" bond wheel on your fussiest tool grinding job and see for yourself. It is available in all tool room shapes and sizes and in any desired grain and grade.

W-705

NORTON ABRASIVES

WITHIN the next few weeks the universities and colleges of America will pour some 80,000 young men into the jig-saw puzzle of industry and commerce, each hoping that a place will be found into which he can fit.

A century ago a young man apprenticed himself to a cobbler, or a printer, or a carpenter, or a baker, or a lawyer, and eventually set up his own shop. But mechanical precision provides advantages of appearance, quality, uniformity, and often of economy, and today men work in groups, using intricate machinery which only can be made available by a considerable outlay of capital, turning out goods and merchandise which is not only much better but much cheaper — all things considered — than could be turned out by the individual workman, working alone with simple tools and more or less primitive equipment.

So the first step in making a place for himself in the world, for the average young man, consists in finding an opportunity to make use of some of the equipment that has been supplied by the capital of others and to be of service in an existing organization; in other words—a job.

We wonder how many of these young men realize what a job really consists of. The type of job for which they have prepared themselves is dependent upon capital investments in buildings, expensive equipment, tools, and materials, and the expenses of supervision, light, heat and power, an office staff, and a merchandising organization. There are other expenses, too, but these are the most essential. Altogether, an investment of more than $4,000 is required in order to create a job of the average kind for one man. In some cases it takes more. For instance, an investment of $7,600 is required to set up a job in the iron and steel industries, $9,000 in the Ford plant, and $6,000 in the General Motors Corporation.

It is obvious that jobs depend on capital investment and it is equally obvious that everything possible should be done to encourage such investment. Instead, however, it would seem that everything is being done to discourage the release of capital by those who control it, the principal discouragement taking the form of high taxes. The cost of government has constantly increased during recent years, and government is supported by taxes. Each and every one of us pays taxes of one kind or another, but the employer of labor is faced with an array of tax demands that is discouraging, to say the least. There are so many kinds of taxes on the average type of business, and demands for reports upon which taxes can be based, that in many cases extra expense is involved in hiring experts to make up the reports and work out the tax problems.

The cost of government — federal, state, and local — mounted from $97 per person in 1933 to $130 per person in 1937, and is still going up. A good part of the money that is levied is spent for relief; to house and feed and clothe those who are unable to find jobs. It is true that people have to live, but if some effort could be made toward reducing taxes to a normal level, with an assurance that the cost of government would decrease henceforth instead of increase, employers might be encouraged to invest more capital in jobs which would provide opportunities for these students who have spent years in obtaining special training.

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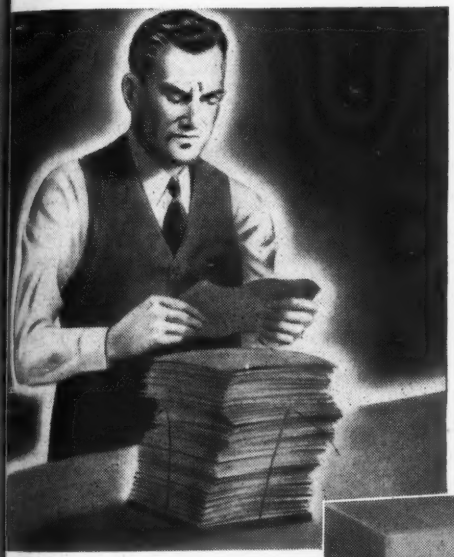

With "Masterpak"—an exclusive AP Package—we take your distributor out of "cracker-barrel" abrasive business. And guarantee to *you* that your order will arrive promptly . . . factory-fresh, crisp and ready for use . . . untouched by moisture, dirt or rough handling.

Another feature of AP's service program is 48-hour ACTION on all special orders (just 24 hours for *regular* items). Our flexible production schedule is *designed* to be broken—so that *yours* need not be . . . The advantages listed at the left are just a few of the reasons why thousands of users are finding it's profitable to specify "AP" for all abrasive needs—from a ream of standard sandpaper to a built-to-order belt. Abrasive Products, Inc., 507 Pearl Street, South Braintree, Massachusetts.

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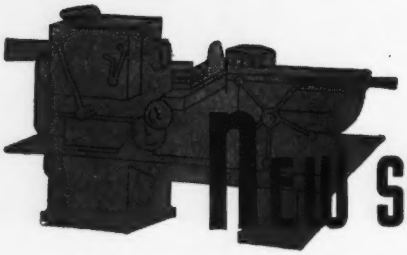
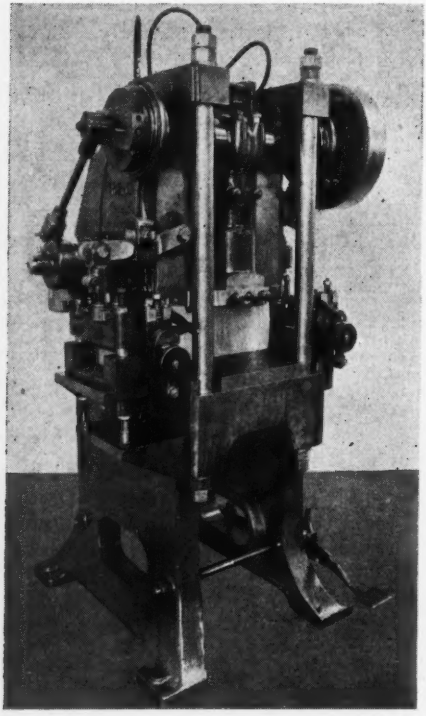


NEW SHOP EQUIPMENT

V & O No. 2HS High Speed Press

A high speed blanking press designed for extreme accuracy, rigidity, and speed, as well as complete accessibility, has been brought out by The V & O Press Company, Inc., Hudson, N. Y. The machine is intended to make possible the use of standard dies with a minimum of attention and expe



V & O No. 2HS High Speed Press

The body, bed, and legs of the m chine are cast integral, providing e treme rigidity. While in general it is the gap type, the throat is very sh low. The opening in the bed is sm but the bed contains an unusual amou of material, providing maximum d support. The design also gives the fect of a straight side press with t accessibility of an inclinable. The m chine has overhanging bearings, f eccentric shaft, fully releasable brak friction clutch, and an unusually ho slide, the ways being cut in the so body and fed with automatic lubric tion.

The feeds on this machine are desig ed to operate at high speeds. They a adjustable to compensate for die we and can be swung out of the way wh die changes are made. The drive these feeds is taken from an adjustab crank on the end of the press shaft a is transmitted through a friction ty clutch mounted on a backshaft, then through spiral gears to vertical shaf and by bevel gears to the lower r shaft on each feed. The machine is al fitted with an adjustable scrap cutt capable of operating at speeds up to strokes per minute.

The capacity of the shaft is 17 to pressure near the bottom of the strok Diameter of shaft at bearing, 2½ i and eccentric with standard stroke, 3 in. Flywheel diameter and face, 16 3¾ in. Standard stroke, 1 in. Maximu stroke, 1½ in. Bed area, 19 x 10¾ i Opening between uprights, 12½ i Throat height, bed to bottom of way 9¼ in. Shut height, bed to slide, str down, adjustment up, 8 in. Bolst thickness, 1½ in. Area of slide, 7¾ 9⅝ in. Length of slide ways, 25 Motor required, 2 h.p.

Feed, maximum width of stock, 6 Maximum feed per stroke, 3 in. Min mum distance, top of lower roll to b 4½ in.; to bolster, 3 in. Maximum d

...ce, 4½ in.; to bolsters, 4 in. ...al weight of press, feed and ...or drive, 3,200 pounds.

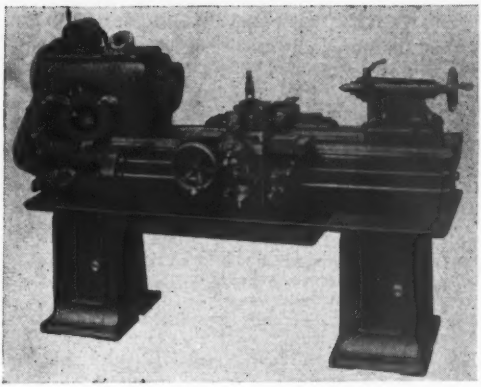
LeBlond Super Regal Lathe

A new line of Super Regal ...thes has been announced by the ...K. LeBlond Machine Tool Com...y, Cincinnati, Ohio. The Super ...al Lathes are manufactured in ...r sizes: 13, 15, 17 and 19 in. The ...ign embodies three distinct im...vements, plus features of safe... accuracy, simplicity, and per...mance.

The three new features are as ...lows:

Speed Selector now built into ...dstock with dial to show cut... speed for commonly machined ...terials, to indicate r.p.m. for proper ...ting speed, to show lever setting to ...ver indicated speed.

Heavier construction throughout the ...ire lathe, but particularly on the ...ys which have been reinforced to re... greater torque and twisting strains. ...e Super Regals are now constructed ...re rigidly to handle heavier stock over increased swing.



LeBlond Super Regal Lathe

Increased swing. Swing over ways on the 13-in. machine is 13¼ in.; on the 15-in., 15¼ in.; on the 17-in., 17¼ in.; on the 19 in., 19¼ in. Swing over carriage and taper attachment on the 13-in. is 8¼ in.; on the 15-in., 10 in.; on the 17-in., 10½ in., and on the 19-in., 12 inches.

BERGRAM Utility Grinders
"Grinders With Many Uses"

Accurately Grind:

1. End Mills
2. Small Cutters
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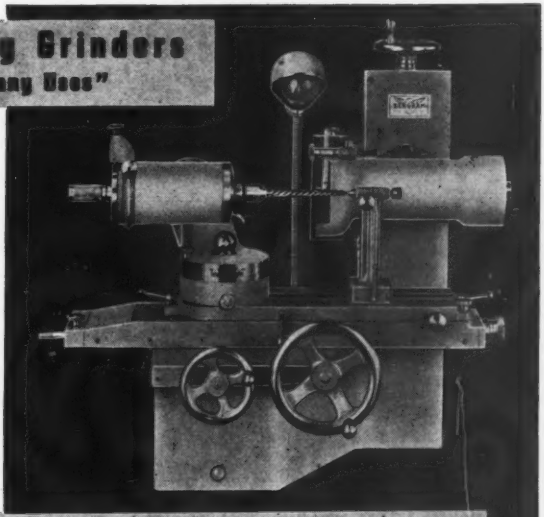
4. Tap—lands and flutes
5. Formed Tools

A Few Features:

1. Easy Setup without Wrenches
2. Work ground from Shank or on Centers
3. Sensitive grinding — Ball Bearing work Spindle

WRITE FOR ILLUSTRATED FOLDER



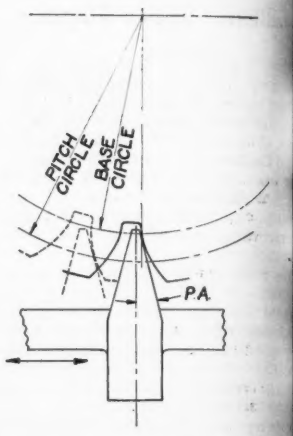
BERGRAM MECHANICAL ENGINEERING CO., INC.
18 HARTFORD AVE. • NEW BRITAIN, CONN.

Michigan Involute Checker

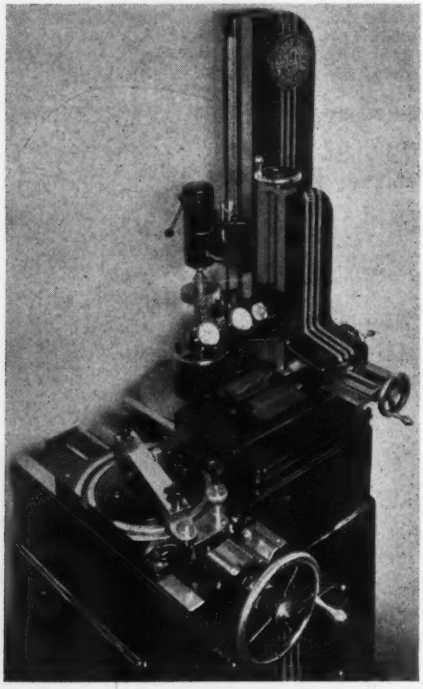
An involute checker for production and laboratory checking of gears has been anounced by Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich. The checker is easy to set up, and it is estimated that set-up time has been cut in half with the new design over previous models.

With the indicating head of the instrument, gears are checked from the pitch diameter, using a master rack tooth which contacts the gear tooth instead of the conventional pointer. The correctness of this method of checking, regardless of gear specification, is illustrated in the drawing herewith.

Since involute forms are generated from the base diameter, the tangential movement of the rack tooth with relation to the gear is directly proportional to the angular rotation of the gear, regardless of pressure angle and diameter. The actual amount of movement depends upon the base diameter of the gear and pressure angle of the ra The setting of the sine bar on t machine to provide the correct amou



Drawing Illustrating Method of Checki Gears from Pitch Diameter by the use o Master Rack Tooth

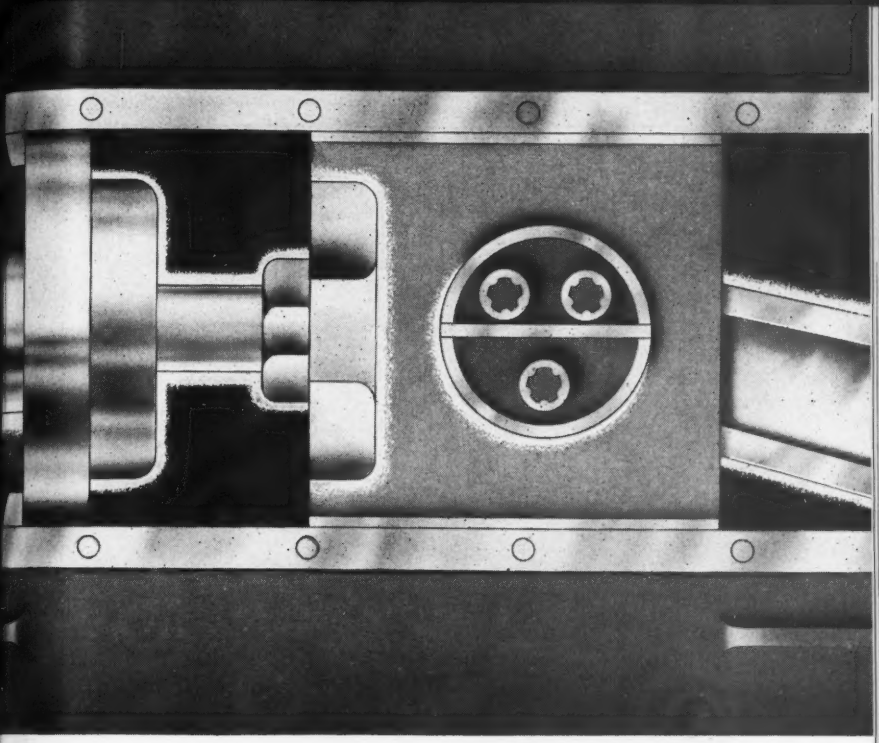


Michigan Involute Checker

of movement is determined by simp calculation. Except for this variati in setting-up the machine, gear chec ing is identical with the procedure fo lowed when using a tracing finger.

The Checker is provided with a fi master base circle integral with th work-holding spindle, thus providi greater accuracy, better balance, and a lowing greater rotation of the gear an work spindle. The sine bar, which ac as a compensator for differences be tween the length of arc of the mast disc and the length of the base circ of the gear being checked (per degr of rotation), is mounted on a carria moved by a lead screw. A single e centric clamp is provided on the ta stock for rapid set-up of differe lengths of gears and arbors, and a indicator elevating screw is provid for quick adjustment.

The checker is attractively streal lined, and is available in various co umn heights. Shown in the illustr tion is the high column model which designed to take care of gears rangi up to 26 in. between centers. The stan ard model has a column height whi is designed for checking of gears th require 18 in. of clearance between h head and tailstock.



MAKING PRODUCTION DOLLARS S-T-R-E-T-C-H

The simplification or elimination of fabricating processes is one way of making production dollars go farther. Molybdenum steels are often a help in that way.

For instance, a manufacturer of high pressure motor driven pumps uses cast Nickel-Molybdenum steel for cross-head guides because it has the required toughness and hardness. In addition, the ready machinability and close grained structure of the steel make it possible to produce a good bearing surface in the guide runways by a light cut with a shearing tool. One finishing operation—grinding—is entirely eliminated.

Rechecking your own material specifications may reveal places where Molybdenum steels will produce better results, or lower costs, or both. Our technical book, "Molybdenum in Steel," will be sent free to any interested production executive or engineer who requests it.

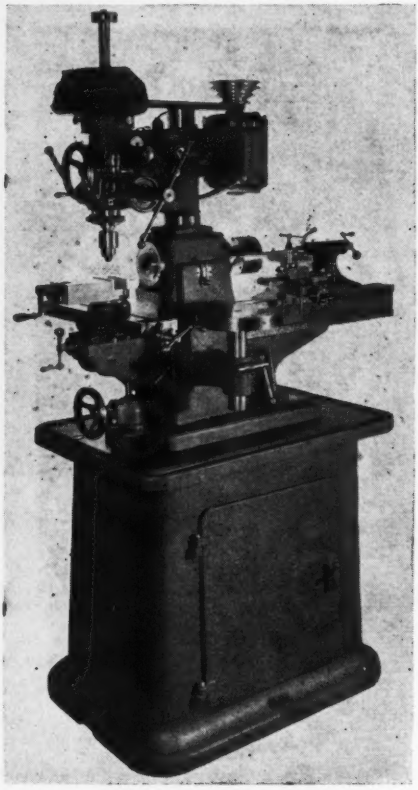
PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Molybdenum Company
500 Fifth Avenue New York City

MOLY

Gilman 4 in 1 Tool Room Machine

A machine designed to offer the advantages of a precision lathe, sensitive drill, horizontal mill, and vertical mill and especially intended for tool, die,



Gilman 4 in 1 Tool Room Machine

and fixture work has been brought out by Gilman Engineering Works, Janesville, Wis. The features of the machine are said to be precision, power, performance, ease of setting up, and adaptability to a wide variety of work.

The bed is of close-grained metal and is mounted on a heavy base. The tailstock is gibbed on all bearing surfaces for take-up in any direction. Gibs are hardened and ground. The spindle is of chrome nickel steel, hardened and ground, and is of large, extra stron design. It is intended for a No. 5 Gi man split taper chuck and adapters wit No. 5 shank. The Gilman compoun slide is said to facilitate high precisio work.

The maximum swing of the lathe 9 in. Length of bed is 30 in. and dis tance between centers is 18 in. Rang of spindle speeds is 130 to 1,200 r.p.m Unit powered by 1 h.p., 1,725 r.p.m. re versible motor.

The drill unit has four spindle speed of 390 to 2,220 r.p.m., intended to mee every requirement for efficient perform ance. The 9-in. adjustable table is rigid ly mounted to a sturdy column.

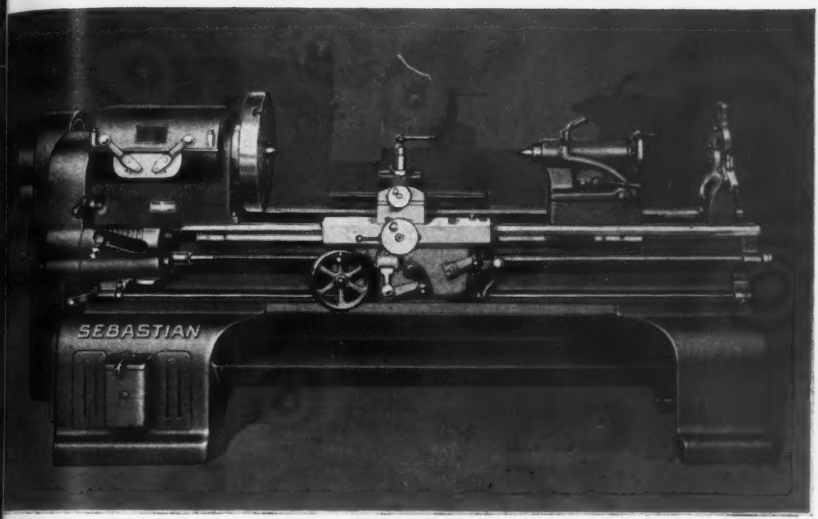
The horizontal mill has a hardened an ground chrome nickel steel spindle an an accurately machined table rigidl fitted to long bearings with an adjus able gib in the saddle. The workin surface of the table is 5 x 15 in. an the table travel is 10 in. Hand cros feed capacity, 3 in. Vertical feed o knee, 5½ in. Six spindle speeds ar available from 130 to 1,200 r.p.m. Motor reversible, 1 h.p., 1,725 r.p.m.

The specifications for the vertical mi are same as those of the sensitive dri so far as the spindle, quill, and speed are concerned, and specifications for th table, saddle, and knee are same as th horizontal mill. The diameter of th table is 9 in.; diameter of quill, 2½ in. length of quill, 8½ in.; diameter of spin dle, 1⅜ in. The height to the cente of the spindle is 48 in., height to to of cabinet is 30 in., and total heigh of machine is 72 in. Floor space re quired, 24 x 36 in. Weight with stand ard equipment, 1,375 pounds.

Cincinnati Nos. 1-12 and 1-18 Plain Automatic Milling Machines

The Nos. 1-12 and 1-18 Plain Auto matic Milling Machines which have bee introduced by The Cincinnati Millin Machine Co., Cincinnati, Ohio, are sai to be easy to set up, fast in operation and designed for the rapid milling o small parts for all industries. The ma chines are the manufacturing type, com bining high spindle speeds and fas feeds, and are especially suited for th fast, economical production of small parts for business machines, small arms cash registers, sewing machines, typ writers, automobiles, and aircraft.

A 3 h.p. motor with totally enclose drive provides power for a varied rang



It's 1 to 10 a Sebastian will do it!

Low priced *Sebastian Lathes will handle 90% of all modern turning jobs.*

ay job of routine production turning is made-to-order for a Sebastian Lathe. If an extra ep cut is required or an unusually high speed, if, in other words, the job is "special" t is possible that Sebastian Lathes will not serve the purpose.

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All-Timken Equipped Geared Head Lathes including Motor and Switch.

12 x 4	$1,100.00
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16 x 6	1,660.00
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20 x 8	2,130.00

F.O.B. Cincinnati

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If no Sebastian dealer is convenient write the Sebastian Lathe Company—Box 1017-B, Cincinnati, Ohio.

Adopt the motto of smart machinery buyers everywhere—

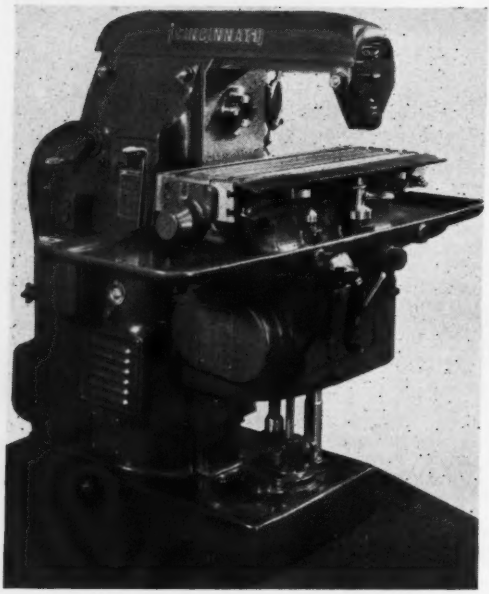
See

SEBASTIAN *GEARED HEAD* *TIMKEN BEARING* LATHES

First!

Designed and built under the most up-to-date and exacting quantity production methods — to meet 90% of all modern industrial requirements.

Manufactured under rigid precision standards and guaranteed to give efficient performance in the field for which they are designed.



Cincinnati Plain Automatic Milling Machine

of work for the machines. The No. 1-12 machine has a power table travel of 12 in., and 18 in. of travel is provided on the No. 1-18. Reaching their greatest efficiency on production milling, the machines feature dog-controlled, automatic table cycles with intermittent feeds, a hydraulic backlash eliminator, an automatic spindle stop, screw feed to the table, and single lever finger tip start-and-stop lever for the table.

Sixteen spindle speeds from 50 to 1,500 r.p.m., obtained through heat treated pick-off gears and a back gear, are standard. An alternate range of 40 to 1,500 r.p.m. can be supplied at extra cost. Easily accessible for changing spindle speeds, the pick-off gears are located in a protected compartment in the left side of the machine column. The rotation of the spindle may be started or stopped by a control lever located on the left of the column. An automatic spindle stop, actuated at the end of the table cycle to prevent mishaps from revolving cutters during loading operations, is available at extra cost. The enclosed motor drives a constant speed pulley through multiple vee-belts and a hinged motor mounting compensates for belt wear.

A completely anti-friction drive including a double mounting, both front and rear, of anti-friction drive including a double mounting, both front and rear, of anti-friction bearings for the spindle, helical gears in the drive, and automatic lubrication, provides a quiet flow of power from the motor to the cutters. A spindle reverse is provided. The spindle nose is the National Standard with the No. 40 Series taper hole. A quick hand adjustment and clamping lever for the quill, which is graduated in thousandths of an inch, are located on the right of the column.

A standard range of 16 table feeds from ¾ to 30 in. per minute is standard. A high series from 1½ to 60 in. and a low range from ½ to 21½ in. can be supplied. All feed changes are obtained by pick-off spur gears located in a compartment on the left side of the knee. Gears not in use are stored in a rack built into the motor compartment door.

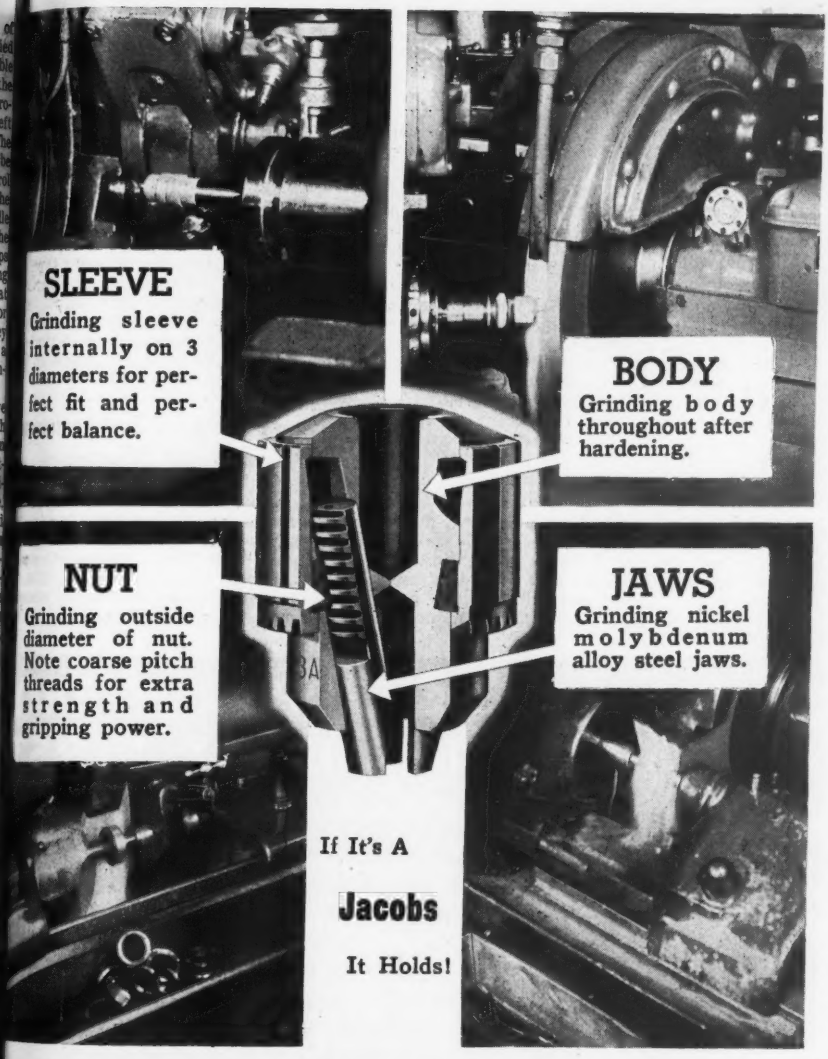
A complete automatic dog-controlled working cycle for the table, which in-

"OUTWEARS the best Bronze Metal"

20 years ARGUTO without a drink—

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.


SLEEVE
Grinding sleeve internally on 3 diameters for perfect fit and perfect balance.
BODY
Grinding body throughout after hardening.
NUT
Grinding outside diameter of nut. Note coarse pitch threads for extra strength and gripping power.
JAWS
Grinding nickel molybdenum alloy steel jaws.
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cludes a 300-in. per minute power rapid traverse, is provided. It is possible to obtain a dog-controlled intermittent feed and rapid traverse in any combination or in either direction. Positioning a control lever on the front of the knee, directly in front of the table, determines the direction of table travel and also selects either feed or rapid traverse movement of the table. A finger tip control operating lever, located to the right of the crank controlling the vertical adjustment of the knee, starts and stops the table without changing the operating cycle in any way. Hand traverse movement for positioning the table when setting up is obtained by a crank on the right hand side of the knee.

The table width is 10 in. and the table is provided with three T-slots having a 2½-in. spacing. This arrangement, plus the long quill adjustment of 2⅝ in., gives increased flexibility of fixture design and permits the work to be brought close to the column.

For climb milling operations, a hydraulic backlash eliminator is provided. The unit consists of a nut on the table feed screw moved axially by hydraulic pressure but prevented from rotating on the screw by keys extending from an adjacent bushing. Operating in conjunction with the convenient fixed n the backlash nut pulls the leadscre always in the direction of feed. T backlash nut is energized hydraulica from the pilot valve controlling the ta feed cycle. Table lag or forward mov ment of the table under cuts is pr vented. The entire backlash unit is h draulically neutralized during rapid tr verse movements of the table.

The No. 1-12 and No. 1-18 Milling M chines are patterned generally after t Cincinnati knee and column type mill in that they have a pyramid-type co umn with a self-aligning Cincinna Rectangular Overarm and light weig arbor supports. There is no saddle the design of the two new automati and a vertical hand adjustment of 8 for the knee is provided.

Oilgear Type XL Horizontal Broaching Machines

A line of horizontal broaching ma chines, designated as the Type XL which incorporates modern design, co trol, and operating features has be introduced by The Oilgear Compan 1323 W. Bruce St., Milwaukee, Wis. T line includes nine standard sizes horizontal broaching machines in c

IN MODERN DIE SHOPS . . . THEY THINK OF CERROMATRIX FIRST

This low-temperature-melting alloy is not a makeshift, used merely for unimportant dies. In well-known shops, when making a die for regular production, they think of the CERROMATRIX method *first*. It saves time and money and makes perfect alignment easy. In the die at left (owned by Scott & Fetzer Co., Cleveland) 4 ozs. of Cerromatrix saved hours of labor.

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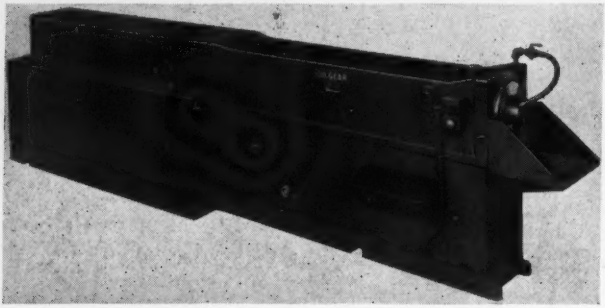
pacities varying from 6,000 to 100,000 lbs. normal broaching capacity with working strokes ranging from 36 to 72 in.

Each size of machine is equipped with an Oilgear Type "DX" two-way variable displacement heavy duty radial piston fluid power pump of sufficient capacity to provide variable cutting speeds up to 37 ft. per minute and independently variable return speeds up to 100 ft. per minute. Two convenient adjustable dogs with needle bearing rollers are mounted on a sturdy rotary-acting control rod in the broach trough so that any requirement as to the working stroke or start-and-stop position of the crosshead can be met to best suit the work performed and tool used, thus assuring maximum production capacity.

The machines are said to be equally well adapted to both internal and external broaching operations. The unusually large face plate provides ample space for mounting simple or complex fixtures. Ample clearance for large internal and external operations is provided through the use of face plate holes up to 11-in. diameter and the distance between the ways up to 10 in. A removable main bushing reduces the hole in the face plate for smaller work. Adjustment is provided on the crosshead to raise and lower the tool puller for keyway and spline broaching.

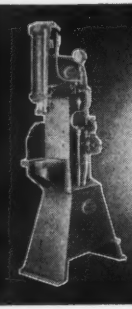
Ease in operation and control of small or large machines with less fatigue to the operator is possible with the simple push button control. It is said that no effort or skill is required to perform complex operations. One button is depressed for the broaching stroke and another button for the return stroke. Positive emergency stop at any time is assured by depressing a large raised mushroom button. An alternate toe lever switch also controls the crosshead motion, thus leaving both of the operator's hands free to handle the work and tool.



Oilgear Type HL Horizontal Broaching Machine

Conventional control valves, links, rods, springs, detents, and pins have been eliminated.

Standard equipment on each machine consists of the following: an all-steel welded frame which supports the trough, cylinder, pump, motor and coolant pump, contains ample reservoirs for the oil in the fluid power system and for tool coolant, and enclosed the pump, motor and operating mechanisms; a cast steel trough fitted with hardened and ground rectangular steel ways; a steel crosshead with long-wearing replaceable bronze liners; vertical adjustment for the puller; a bored and honed steel cylinder with closely fitted ring type piston, ground ram and molded ram packing; an Oilgear Type "DX"



BROACH and ASSEMBLE

At left: Self-contained 4-ton Greenerd Hydraulic Arbor Press adaptable for assembling, broaching, burnishing, etc. Adjustable ram stroke from 1/2" to 16".

At right: 12-ton Bench Press.

We also make 65 styles of Rack and Pinion Presses. Hydraulic Presses from 1 1/2 to 15 tons capacity. Write for details.

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* MO-MAX is a proprietary name owned and controlled by The Cleveland Twist Drill Company, and its only licensed use by others is on steel made and sold by licensees under patents owned or controlled by said Company.

two-way variable displacement fluid power pump with solenoid-operated pilot control, arranged for direct drive; dual push button control and toe lever switch with emergency stop button; a mechanism for adjusting crosshead stroke, cutting speed and return speed; necessary piping, a direct reading pressure gage, and one main reducing bushing, and a motor-driven lubricant pump with piping and coolant nozzle.

For supporting long tools, a trough which is bolted to the sides of the face plate is supplied. It is fitted with soft or hardened and ground rectangular steel ways, a guided carriage and tool-clamping fixture.

These complete, self-contained, high speed broaching machines will pull peak loads equal to 150 per cent of the normal capacity or a range of from 9,000 to 150,000 lbs. pulling capacity. Pre-set relief valves built into the pump protect the work, tools, pump, and machine against overload.

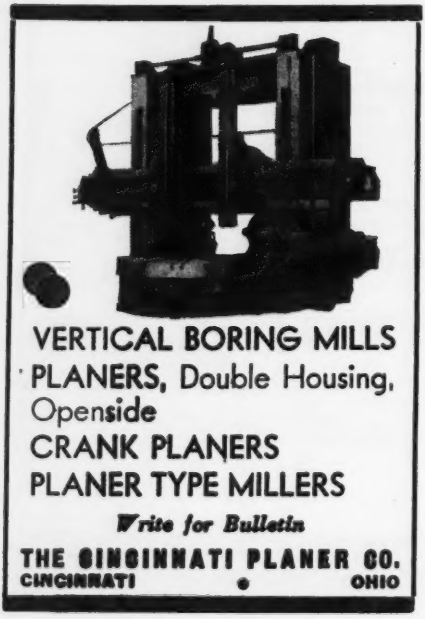
Elmes High Speed Hydraulic Press

Charles F. Elmes Engineering Works, 216 N. Morgan St., Chicago, Ill., has brought out a high speed hydraulic press which has several interesting features, notably its unusual speed on hydraulic drawing and forming operations. Controls are said to be extremely sensitive and accurate and the stroke of the moving platen—which is guided precisely on four adjustable gibs—is simple to adjust. The platen can be lowered a fraction of an inch at a time, facilitating setting of dies. Moreover, the stroke adjustment makes it possible to limit the idle stroke to a minimum, resulting in maximum production.

Elmes High Speed Hydraulic Press

The bed is arranged for a cushioned cylinder. All moving parts are pressure lubricated, the top head serving as an oil reservoir as well as a base for mounting the pump, motor and controls. Ventilation is provided by louvres in the cover.

Openings are provided in the side housings for illuminating lamps, the lamps being so arranged that the light is cast directly on the dies, making the work easily visible to the operator. Rigid construction and pleasing design are added features.



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In the Aircraft Industry

Doing their part in producing better and more efficient Aircraft for Civilian and Military uses, NATIONAL Metal Cutting Tools are at work* in the leading plants of the United States.

*Slot Arm being milled to tolerances of .002" in its entire length (23 inches), with NATIONAL Form Cutter.

*Oleo-Cylinder being drilled 2⅛ inch diameter for its full length of 22 inches with NATIONAL High Speed Drills.

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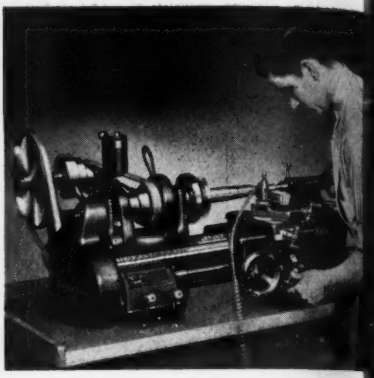
New Model South Bend 9-In. Workshop Lathes

Two new models have been added to the line of 9-in. Workshop Precision Lathes manufactured by the South Bend Lathe Works, South Bend, Ind. The new model lathes, known as Models A and B, are an addition to the current model Workshop Lathe, now known as Model C.

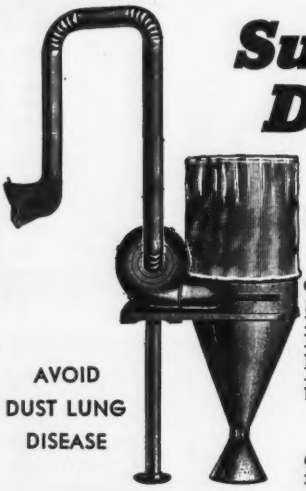
The Workshop Model A Lathe is of the quick change gear type and has an automatic apron with friction clutch drive for operating the power cross feeds and power longitudinal feeds. The Model B is of the standard change gear type and also has an automatic apron with friction clutch drive for operating the power cross feeds and power longitudinal feeds. The Model C has plain change gear equipment, power longitudinal carriage feeds through half-nut and lead screw, and hand-operated cross feeds. All three models are identical with the exception of the apron and the change gear equipment.

The new Quick Change Gear Box developed for Workshop Model A Lathe provides 48 changes for cutting right and left hand screw threads 4 to 224 per inch, and 32 power longitudinal feeds ranging from 0.0014 to 0.0208 in. per revolution of the lathe spindle. Metric thread cutting equipment can be supplied.



New Model South Bend 9-In. Workshop Lathe

The new automatic apron for both the Model A and Model B Lathes is equipped with a friction clutch drive for operating the automatic power cross feeds and automatic power longitudinal feeds. T



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Quicker and better work can be done where the grinding dust is automatically sucked away as you work.

Little space occupied yet concentrated suction power keeps your work clean.
Dust breathed into your lungs daily is too big a price to pay to be without this health protector.

SENT ON TRIAL!

GET ONE TODAY! The cost will average a very few pennies a day—too little to even consider.

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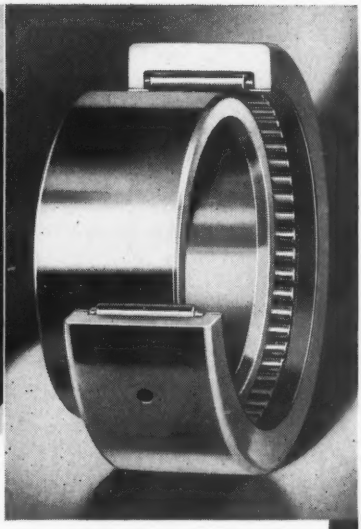
New Type QUILL BEARING WINS QUICK APPROVAL



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The advantages listed at left are a result of the following features: 1—One-piece channel-shaped race, with rigid surfaces, providing solid abutment for end of rollers. 2—Correctly proportioned rollers, accurately hardened and ground. 3—Husky culvilinear trunnions. 4—Positive retaining band which functions only during roller assembly. 5—Simplified design—no fragile parts. 6—Lower cost.

Write for Bulletin 103K which gives complete engineering data. Prompt shipment from stock in shaft sizes from ½" to 5".

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cross feeds and longitudinal feeds are both operated by a worm driven by a spline in the lead screw.

All three models of the Workshop Lathe are available in both bench and floor types, with bed lengths in 3, 3½, 4 and 4½ ft. Several types of drives are offered, including horizontal motor drive for bench lathes, pedestal motor drive for floor type lathes, countershaft drive, V-belt horizontal motor drive, and a 12-speed horizontal motor drive.

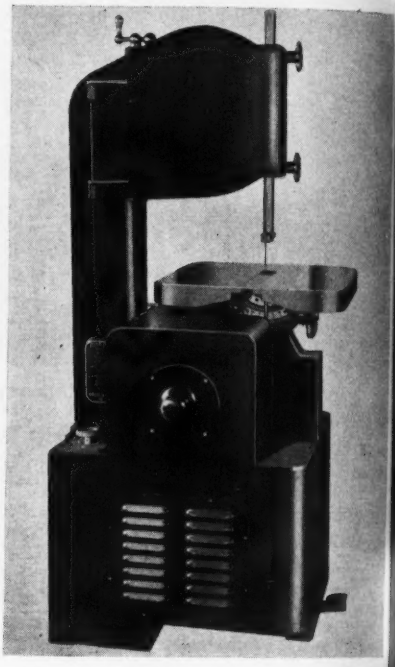
Features of all three models of the 9-in. Workshop Lathe include a heavily constructed lathe bed with three V-ways and one flat way, hand-scraped; an alloy steel headstock spindle with ¾-in. hole for collet capacity up to ½ in.; a back-geared headstock providing six spindle speeds, ball thrust bearing for eliminating spindle end play; an improved oiling system for spindle bearings; twin gear reverse for right and left hand threads and feeds, and hardened headstock spindle.

Grob 14-In. Throat Open End Band Saw Model OS-14

A 14-in. throat open end band saw, designated as Model OS-14, has been placed on the market by Grob Brothers, Grafton, Wis. This machine is designed for use in sawing out medium and small dies, punches, stripper plates, and miscellaneous parts. According to the manufacturer, the set-up for internal sawing requires only 15 minutes, and with equal ease the blade is transferred from one opening to another, ready for sawing. The Model OS-14 machine accommodates saw blades ¼, ⅜ and ⅛ in. wide.

Saw blades 150 ft. long are wound helically on a drum which has a threaded groove. A multiple speed motor provides the forward or cutting speeds and a second motor reverses the band at high speed. Due to special improved design, only 10 seconds are said to be required to reverse the band, whereas, at the slow forward speed the cutting time is 2½ minutes. Features of the machine include, in addition to instant internal sawing, smooth cutting action at all times and a positive drive to the blade. Since at no time is a welded portion of the blade passed through the work, smooth, clean cutting action is said to be assured, making it possible to saw close to a line and to use the blade as a notching tool or as a file. By using the blade as a file, small, intricate dies can be finished within 0.001 to 0.002 in. to the line.

The positive drive to the saw blade is also claimed to be of great advantage. On the open end type machine, the upper guide wheel places just enough ten-



Grob 14-In. Throat Open End Band Saw Model OS-14

sion on the blade to keep it from becoming loose, so that the entire strength of the blade is used for sawing purposes.

The Grob Band Saw Model OS-14 is equipped with specially designed saw guides which are said to assure perfect alignment, full support immediately below and above the work, and long life to the saw blade. The base of the machine is of welded steel construction, and the column and table assembly of cast iron. The table tilts four ways and measures 20 x 20 in; the distance from the floor to the table is 40 in. The control switches are located in the rear of the machine, while the push button for operating the machine is placed in convenient reach of the operator. The motors and drive are built into the base. Approximate weight, 1,000 pounds.

A Real One-Hand Drill— The New 3/16" HORNET

Van Dorn's brand new 3/16" HORNET Drill is a midget in size but a giant in action. Only 6 inches long, weighs only 34 ozs., but it has all the power and stamina necessary to perform under continuous production line service. The new HORNET can be used steadily, without fatigue, in the most inaccessible spots because of its compactness and minimum spindle offset.

Splined gear mounting, spindle bearing design, screened air inlets and large fan assure cool, frictionless, trouble-free service no matter how tough the job.

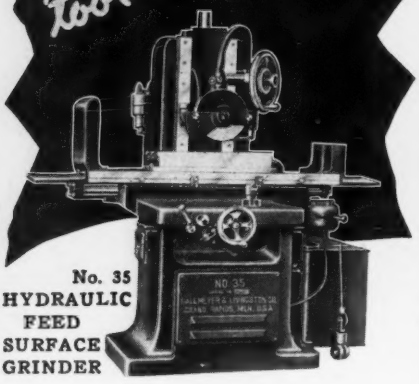
Why not call your Van Dorn Jobber for a demonstration today. Or write: Van Dorn Portable Electric Tools (Division of Black & Decker Mfg. Co.), 720 Joppa Road, Towson, Md.

"Van Dorn"

THE "RED HEADED" PORTABLE ELECTRIC TOOLS

"GRAND RAPIDS"

for production and tool room grinding



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● A speedy grinder — extremely flexible — for production tool room grinding.

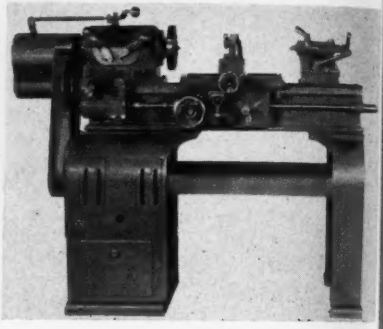
Longitudinal and transverse table movements operated hydraulically, any speed can be obtained up to the maximum of 115 feet per minute.

Write for catalog on this precision grinder today.

Gallmeyer & Livingston Co.
308 STRAIGHT AVE., S. W.
GRAND RAPIDS, MICH.

Sebastian Type EV High Speed Lathe

To meet the need for a small high speed lathe for use in turning aluminum, bronze, and similar metals, The Sebastian Lathe Co., Cincinnati, Ohio, has brought out the Type EV High Speed Lathe shown in the illustration. This lathe has eight speeds ranging from 80 to 2,000 r.p.m., and four feeds of 0.010, 0.020, 0.040, and 0.080 in. In addition, the lathe features a Timken-equipped geared head having shaved, heat-treated



Sebastian Type EV High Speed Lathe

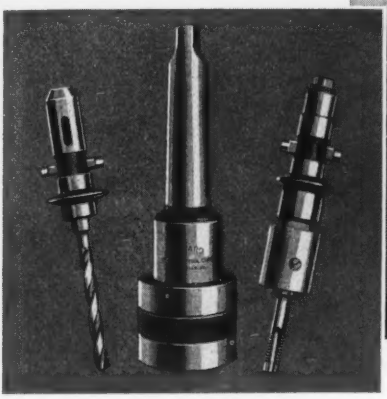
gears to assure quietness of operation. The headstock spindle contains a 1⅛-in. hole and is fitted with a dog plate which is locked on the spindle by means of a set screw.

A quick stop brake, chip pan, and plain tool block are provided, the standard or European tool post being optional. The cross slide is furnished with Sebastian patented diameter stops, while the carriage is equipped with an automatic adjustable safety stop for use when feeding toward the headstock. The Type EV lathe is vee-belt drive equipped, and is powered by a 2 h.p. motor enclosed within one of its legs. A stop and start lever is located within easy reach of the operator. Beds up to 5 ft. long and 35 in. between centers are available.

For turning diameters on workpieces when the tools are held in the front or front and rear cross slides, two gages are secured to the cross feed screw. One set of gages consists of a pair of discs which are notched to receive two dogs, the notches being so located that if the tools are fed up to the work by the cross feed, they continue to cut until the dog drops into the notch controlling

WIZARDS Keep Your Spindles Turning

WIZARD Chuck Outfit shown in operation the right includes one chuck in the drill spindle and 27 collets, one for each tool job requires, drills, reamers, taps, etc. The operations are performed in quick succes- without stopping the spindle.



A McCROSKY WIZARD Quick-Change Chuck outfit enables a drill press operator to change tools without slowing or stopping the spindle. It olds tools rigid and centered, an exclusive WIZARD feature. WIZARD riction-Drive Tapping Collets protect taps from breaking and permit drill- g blind holes at tapping speed. A WIZARD Collet can be provided for very kind of tool you use.

To determine the WIZARD Outfit that will keep your spindles producing, send for McCrosky Bulletin No. 15-D

McCROSKY TOOL CORPORATION
1340-70 MAIN STREET. MEADVILLE, PENNA.
COST CUTTING TOOLS

the feed of the front or rear cross slide, as the case may be. This determines the diameter. The discs are of such a diameter that a cross movement of 0.001 in. for the cross feed corresponds to $\frac{1}{10}$ in. on the circumference of the discs, consequently a high degree of accuracy is said to be secured. When the special cross-feed gages are not being used, a pair of graduated collars for control of the front or front and rear tools are slipped onto the screw instead.

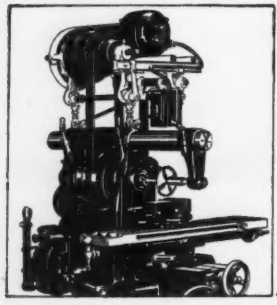
Extra attachments for the Sebastian Type EV High Speed Lathe include a rear connected rest with tool post, compound rest in front instead of plain rest, four-way turret tool post, lever-operated draw-in chuck with $\frac{7}{8}$-in. capacity, collets of $\frac{7}{8}$-in capacity, full capacity collet chuck for spindle, collets of $1\frac{1}{16}$-in. capacity for full capacity chuck, micrometer carriage stop, oil pan with subpan between bed and legs, pump and piping, taper attachment, and turret for lathe bed. Regular equipment includes dog plate, centers, wrenches, 2 h.p. motor, reversing switch, and wiring.

Lake Erie "Hy-Production Streamliners"

A complete series of streamlined Lake Erie Hydraulic Presses, designated as "Hy-Production Streamliners," has been announced by the Lake Erie Engineering Corp., Buffalo, N. Y. These presses are built in a complete range of sizes and capacities. Each press is completely self-contained with the motor-driven pumping unit enclosed in streamlined panels at the top, thus preventing the accumulation of dust on the pumping unit. The frame is streamlined from top to base.

A centralized push button control is mounted flush on the frame for inching, semi and full-automatic operation. The regular controls are centered on a pan located at the operator's feet. The mov ing platen is guided by means of a

Lake Erie "Hy-Production Streamliner"

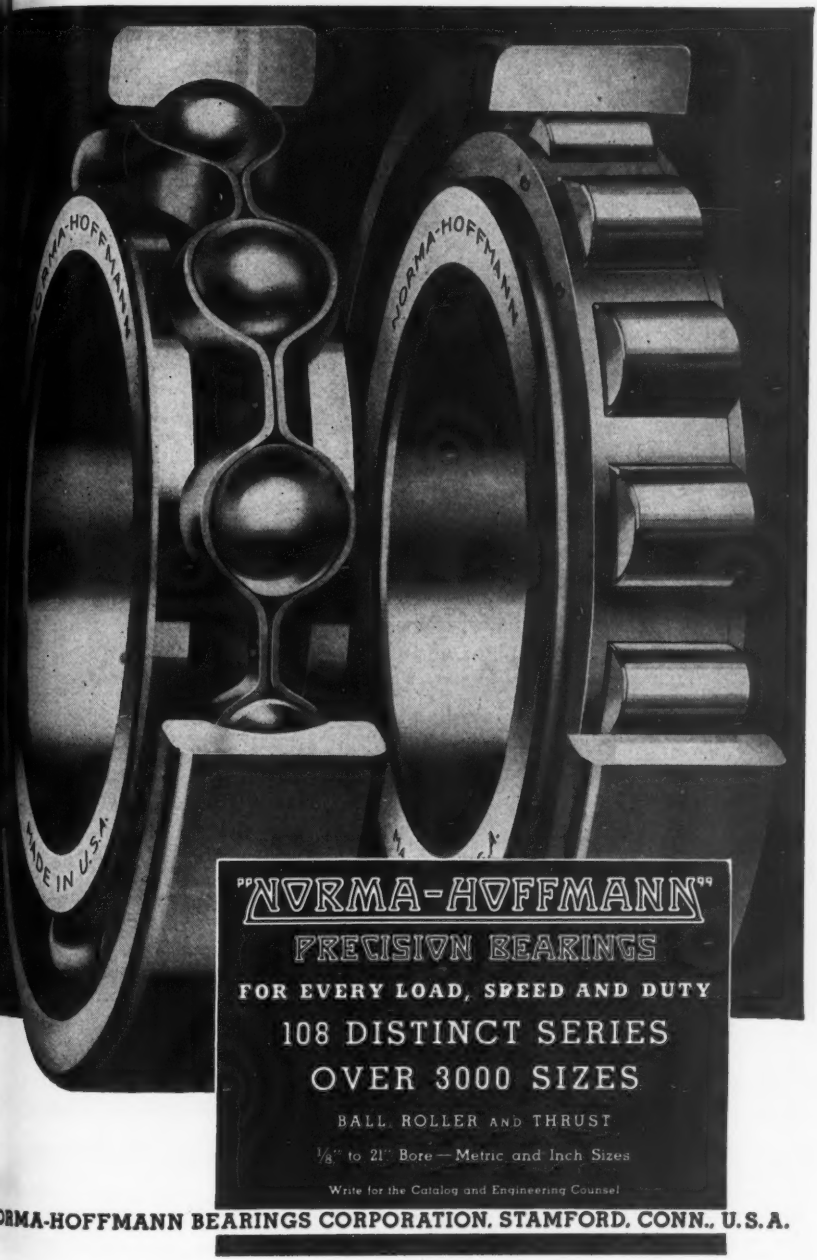


Joe's Strength vs

"Two ton" Tony's bulk. Take your pick. And in picking winners, remember that one Remco brace rod is worth 100 lbs. of bulky cast iron. Strong, rigid, this Remco Motor Drive has three point suspension instead of one or two points. Vibrationless! Folder FREE—write! Remco Products Corp., State and Hay Sts., York, Pa.

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



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PRECISION BEARINGS

FOR EVERY LOAD, SPEED AND DUTY

108 DISTINCT SERIES

OVER 3000 SIZES

BALL, ROLLER AND THRUST

1/8" to 21" Bore — Metric and Inch Sizes

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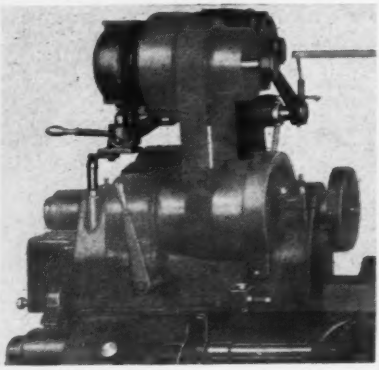
NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U.S.A.



Cullman Drives for

Lathes, Shapers, Punch Presses, Milling Machines, Cleveland Automatic Screw Machines and other Pulley Type machines.

Three Speed Drives are furnished on the screw machines and variable speed can be furnished on Punch Presses.

Motorize and Modernize with

CULLMAN DRIVES

ALSO

Sprockets, Chains, Flexible Couplings and Speed Reducers.

SEND FOR INFORMATION

CULLMAN WHEEL CO.

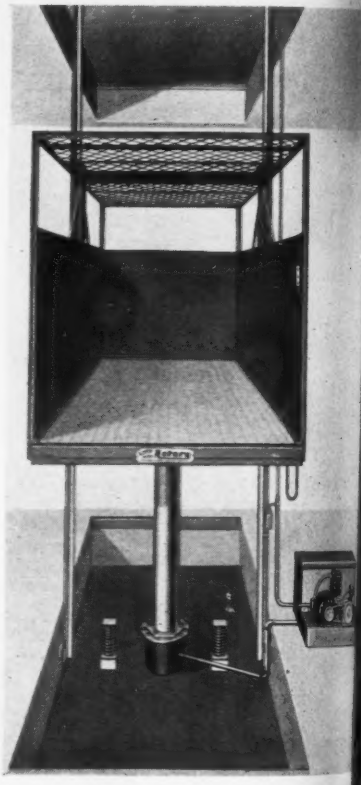
1336 Altgeld St., Chicago, Ill.

justable gibs having angular surface and the platen is arranged for knock-o and for strippers. Large area gibs pr vide adequate bearing and maintain a curacy, while space is provided in t press bed for a die cushion.

Standard equipment of the Lake Er "Hy-Production Streamliner" include an oil strainer and water-cooled oil re ervoir for maintaining correct viscosit

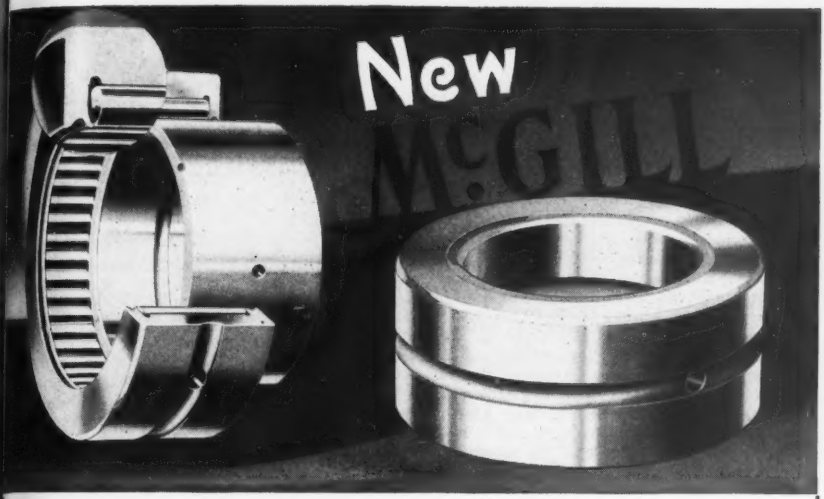
Rotary Electric Oildraulic

Especially designed for moving mat rials vertically to a distance of 30 ft. less, Rotary Lift Company, Memphi



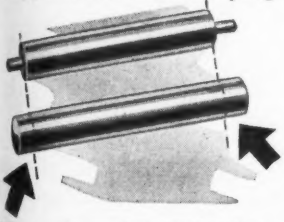
Rotary Electric Oildraulic

Tenn., has developed the Electric "O draulic" Elevator illustrated herew The features of this elevator are said be economy in installation, operati



"Solidend" MULTIROL

12% More Load Carrying Capacity with No Increase in Bearing Width



More roller surface in the New McGILL "Solidend" means more load carrying capacity!

An entirely new outer race construction, made possible by a special process of fabrication, permits the use of full-length rounded-end rollers instead of trunnion-end rollers in the New McGILL "Solid-end" *MULTIROL* Bearing. A minimum of clearance between end shoulders and inner raceway, makes bearing self-sealing. With approximately 12% more effective roller surface, it gives you more load-carrying capacity, in comparison with other bearings of the same width. No end washers or retainer rings to get bent when making tight-fit shaft installations, yet, like the trunnion-end roller bearing, it can be assembled right on the shaft without inner raceway — outer raceway always holds rollers in place. This simplified construction means less cost in manufacturing — more savings for you, and a bearing that is easier to install!

Available in a variety of shaft sizes up to 5 inches, used with or without inner raceway. **Write for Further Details.**

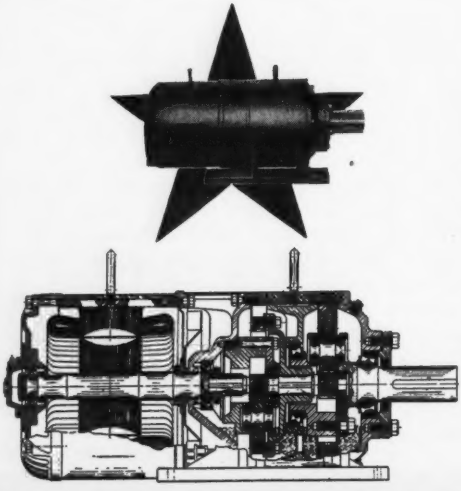
McGILL MANUFACTURING COMPANY
1500 N. Lafayette Street
VALPARAISO • INDIANA

and maintenance, combined with the ultimate in safety and maximum utilization of space.

The Electric Oildraulic operates by pressure of oil electrically pumped into the jack, raising the plunger for lifting from one level to another. The motor and pump operate during only ascent, descent being made by gravity. The load is pushed up instead of being pulled up, consequently the necessity of a penthouse or overhead structure and of reinforcing side walls with heavy, load bearing columns to carry the weight of the car, its load, cables, and overhead machinery, is eliminated. The Electric Oildraulic is intended for light or heavy service with a capacity range of from 500 to 50,000 lbs., made possible by 11 different jack sizes varying in diameter from 3½ through 17¾ in. Although most Rotary elevators are of the low speed type, because of the short haul, speeds up to 100 ft. per minute can be supplied.

The power unit is designed to provide a wide margin of service requirements. The motor can be supplied to meet customer's specifications. Pumps are made in several types to suit varying conditions. The pumps are absolutely quiet when operating and are said to be extremely efficient. The Rotary Perfected Electric-Oil Lowering Valve is designed to assure a velvety smooth drop away from landings, and smooth, accurate stops. Controller can be of the push button or hand rope type as specified. The oil reservoir is compactly formed and covered. Machines can be supplied completely encased for exterior installations.

The hold-down push button control is the most popular type and most practical from all standpoints. Constant pressure of a push button at landings or in the car operates the elevator, which travels in the chosen direction until the button is released. With full automatic control, the momentary pressure of a button sends the car to the chosen landing, where it automatically stops. The car cannot be stopped while in motion. The rope control is practical and easily installed, and provides extremely smooth operation. Rotary cars are built to conform with state and association requirements, with maple, non-skid steel or plain sheet steel flooring. Gates or doors to be electrically or mechanically interlocked to conform to state and municipal codes can be supplied.



STAR

A.C. - GEAR MOTORS - D.C.

For pumps, mixers, dyeing equipment, washers, cranes, elevators, etc.

● This type STAR Gear-Motor is built in sizes from ½ to 75 h.p.* With integral 1800 r.p.m. A.C. or D.C. motors, this type will provide output speeds between 132 and 56.5 r.p.m.*

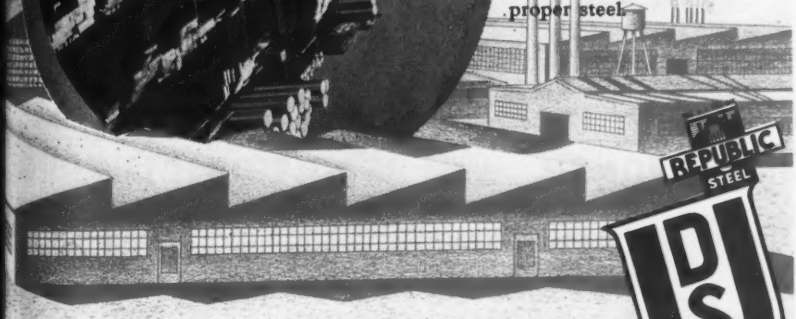
Write for complete details and Catalog showing other styles also.

STAR ELECTRIC MOTOR CO. BLOOMFIELD NEW JERSEY

He puts his stock room RIGHT IN YOUR PLANT!

To have, in effect, a complete stock of your cold finished bar requirements right in your plant, all you need is the stock list of your nearest Union Drawn Distributor. He is equipped and ready to deliver a single bar or a truck load within a few hours after you call him — practically as soon as you could obtain the material, if you went to the expense and trouble of maintaining a large inventory in your plant.

Look up your Union Drawn Distributor. He can save you money in many ways — and he can help you in selecting the proper steel.

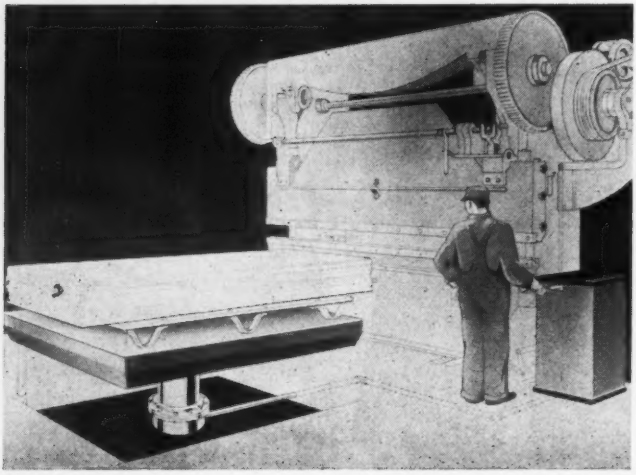


ION COLD FINISHED STEELS

Rotary Tabelator

To meet the need for a means of feeding flat stock to shears, presses, and similar machines, the "Tabelator" Work Elevator illustrated has been developed by Rotary Lift Company, Memphis, Tenn. The Tabelator is designed to provide a simply operated but highly efficient means of increasing production and reducing production costs by providing an uninterrupted flow of work.

The table of the Tabelator can be supplied in any size desired by the user. The Tabelator has a capacity of 6,500 lbs. and operates at a speed of from 1 to 6 ft. per minute. Operated by a single power unit, the Tabelator is independently controlled by a valve at each end, within arm's reach of the operator. Four types of controls are available: (1) the hand lever control at the power unit; (2) remote valve control; (3) the push button control, and (4) the full automatic, "syncro-flow" in which the travel of the table is geared to the speed of the machine. Installations are tailor-made to meet individual conditions and requirements.



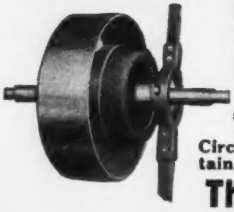
Tabelator as used to raise heavy steel sheets to feeding level of shear. Note hand lever control on power unit.

The Tabelator can be operated by either the Electric-Oildraulic or the Air-Oildraulic power systems. The jack assembly is the same for both. In the Electric-Oildraulic, oil pressure is built up by a motor driven oil pump. In the Air-Oildraulic oil pressure is built up by compressed air. Positive safety control is assured at all times because the load is supported by and locked on a solid column of oil. The table is raised by power and lowers by gravity, but can descend no faster than the oil can return to the reservoir through a fixed orifice. The electric power unit is recommended by the manufacturer because of the economical operation and high efficiency of the unit.

Special safety features in the design

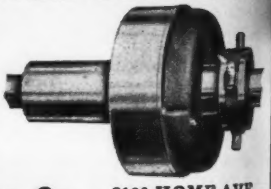
"EDGEMONT" SERVICE TESTED FRICTION CLUTCHES

EXPANDING "TYPE B"



Few moving parts and large friction surfaces are responsible for the efficient service of the "Type B" clutch. Widely used for counter-shaft, line-shaft and other moderate speed drives.

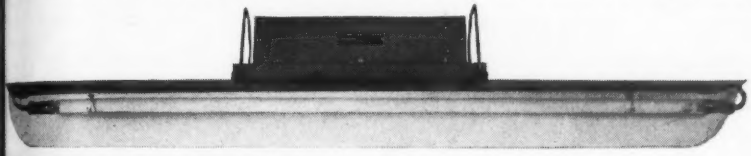
Circular B-4 sent on request, contains complete description and lists.



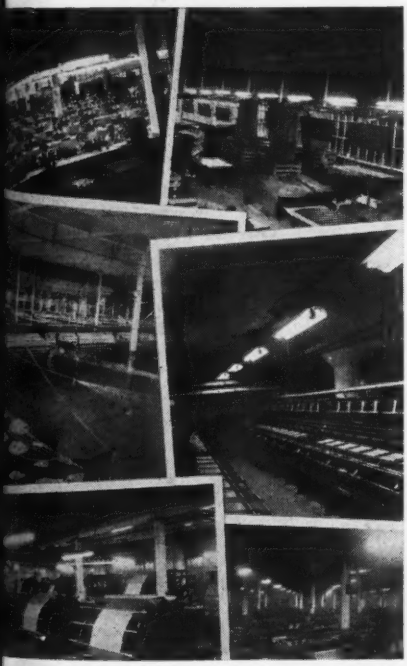
The Edgemont Machine Co.

2100 HOME AVE. DAYTON, OHIO

MEET INDUSTRY'S DEMANDS FOR ECONOMICAL H ILLUMINATION LEVELS . . . THE NEW COOPER HEWITT



100-watt fluorescent lamp

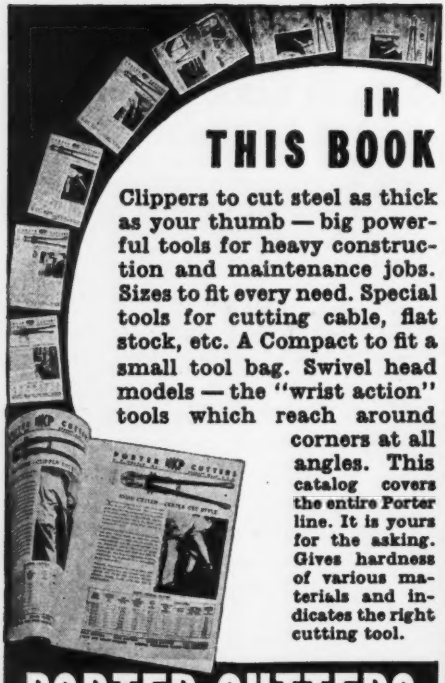


Than Daylight" engineered with Cooper Hewitt Vapor Lamps—Cooper Hewitt Fluorescent Lamps

CONSUMING only 100 watts, this lamp has an output of 5,000 lumens—the greatest output of any lamp of equal wattage now on the market. It provides a cool blue-white light, blending well with daylight. Details are easily seen. It is psychologically cool and actually cool from a physical standpoint thus decreasing the air-conditioning load. » » » Industrial plants of every kind will find it the answer to better employee welfare and better production which inevitably follows when lighting levels are raised and engineered to produce non-fatiguing illumination. Write for a copy of the new bulletin describing Cooper Hewitt Fluorescent Lamps. General Electric Vapor Lamp Company, 897 Adams Street, Hoboken, New Jersey.

GENERAL ELECTRIC VAPOR LAMP COMPANY

936F

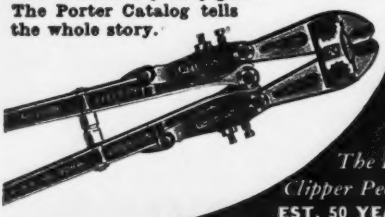


IN
THIS BOOK

Clippers to cut steel as thick as your thumb — big powerful tools for heavy construction and maintenance jobs. Sizes to fit every need. Special tools for cutting cable, flat stock, etc. A Compact to fit a small tool bag. Swivel head models — the "wrist action" tools which reach around corners at all angles. This catalog covers the entire Porter line. It is yours for the asking. Gives hardness of various materials and indicates the right cutting tool.

PORTER CUTTERS

Here is the standard rigid type Porter Clipper — the same tool modernized and perfected — known the world over for more than fifty years as a Porter "Bolt Clipper." It cuts bolts, rods, heavy wire in one quick, positive bite. For production or maintenance, wrecking or construction no tool on the job is more essential or efficient. Made in a number of capacities and models from a handyman size to the heavy duty giant.
The Porter Catalog tells the whole story.



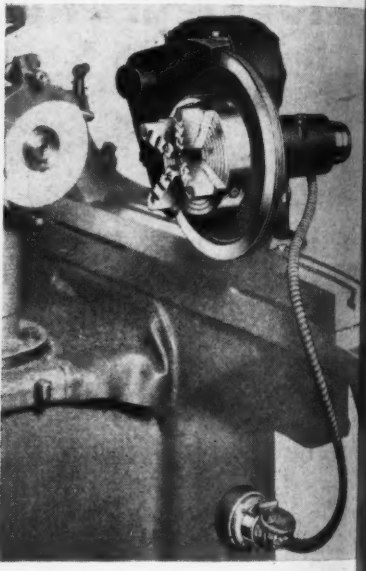
The Bolt Clipper People
EST. 50 YEARS

H. K. PORTER, INC.
15 ASHLAND ST., EVERETT, MASS.

include a bevel toe guard comprising a slanting face underneath the side of the table which pushes back anything that may be protruding into the hatchway as the platform descends, metal skirt guard and wainscot, pipe railing, chain guards, collapsible gates, and so on.

B & S Revolving Spindle Headstock

The illustration shows a motor-driven headstock, product of the Brown & Sharpe Mfg. Co., Dept. 43, Providence

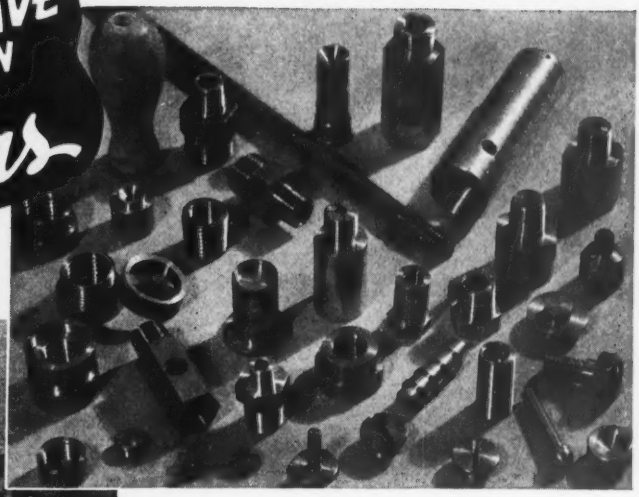


B & S Revolving Spindle Headstock

R. I., which provides a ready means of performing straight or taper cylindrical grinding operations on the B & S No. 1 Cutter and Tool Grinding Machine. The centers can swing work up to 10 in. in diameter and take 17 in. in length. In addition, miscellaneous chucking operations are made possible through the provision of a 4-in., 4-jawed independent chuck which can be quickly mounted on the face of the spindle pulley in place of the work driver.

The spindle unit is driven by a single V-belt from a ¼ h.p., constant-speed motor mounted on the headstock. The

YOU'LL SAVE WITH AN Atlas



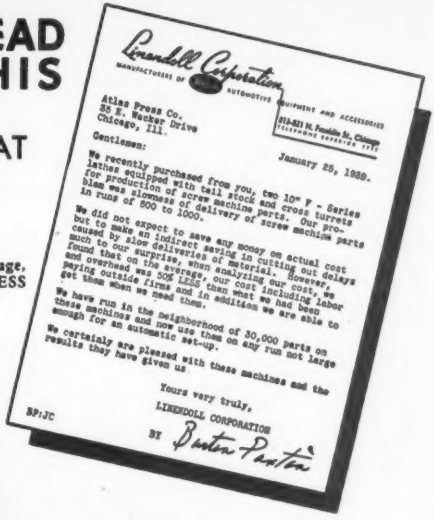
READ THIS

THE ATLAS LATHE IS A GREAT TIME-AND-MONEY-SAVER ON PRODUCTION WORK

"Much to our surprise we found that on the average, our cost including labor and overhead, was 50% LESS than we had been paying . . . and we are able to get parts when we need them."

That's typical of results in hundreds of plants where economical new Atlas F-Series 10" Lathes have been put to work. Power Cross Feed is standard equipment on the new Atlas. Send for the 1939 Catalog showing all the modern features.

Atlas is prepared to recommend proper tools and attachments for industrial turret jobs. When requesting information, send sample parts, or sketches and principal specifications.



Linendoll Corporation
MANUFACTURERS OF AUTOMOTIVE EQUIPMENT AND ACCESSORIES

Atlas Press Co.
35 E. Wacker Drive
Chicago, Ill.

January 25, 1939.

Gentlemen:

We recently purchased from you, two 10" F - Series Lathes equipped with tail stock and cross turrets for production of screw machine parts. Our previous method was slowness of delivery of screw machine parts in runs of 500 to 1000.

We did not expect to save any money on actual cost but to make an indirect saving in cutting out delays caused by slow deliveries of material. However, much to our surprise, when analyzing our costs, we found that on the average, our cost including labor and overhead was 50% LESS than what we had been paying outside firms and in addition we are able to get these when we need them.

We have run in the neighborhood of 30,000 parts on these machines and now use them on any run not large enough for an automatic set-up.

We certainly are pleased with these machines and the results they have given us.

Yours very truly,
LINENDOLL CORPORATION
BY Burton Purton

BP:JC

ATLAS PRESS CO. 546 N. PITCHER ST. Kalamazoo, Michigan

NEW YORK—130 W. 42nd St. CHICAGO—35 E. Wacker at Wabash
PHILADELPHIA—113 N. Third St.

LATHES · DRILL PRESSES · ARBOR PRESSES · SHAPERS

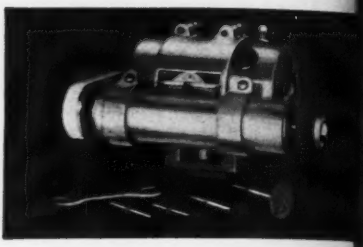
spindle speed is 300 r.p.m. when using a 60 cycle A.C. or D.C. motor. The motor position can be easily changed for proper belt tension adjustment, and a belt guard amply protects both the belt and the motor pulley.

The headstock spindle is mounted in a taper bronze bearing which is provided with means of adjustment for wear. The center turns with the spindle, and is seated in a No. 6 B & S taper hole. A $\frac{7}{16}$-in. hole through the spindle permits the use of a rod to knock out the center. The headstock swivels on its base and may be set at any angle in a horizontal plane, the setting being indicated by a scale graduated in degrees to 100 each side of the zero. A clamp bolt maintains the adjustment. The rigid base is aligned accurately on the swivel table of the machine by means of two tongues and is clamped in position by two T-bolts which fit the angular table slot and draw the attachment tongues against the side of the T-slot.

The B & S Revolving Spindle Headstock is furnished only with motor, switch, and wiring complete, and must be fitted to the B & S No. 10 Cutter and Tool Grinding Machine. Net weight, approximately 62 pounds.

Themac Type J-15 Grinder

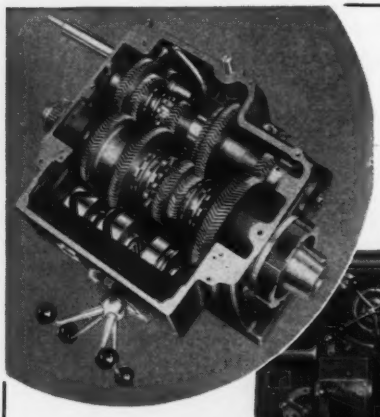
To the line of Themac grinders ma by The McGonegal Manufacturing Co pany, Jones Bldg., East Rutherfo N. J., has been added the Type J-



Themac Type J-15 Grinder

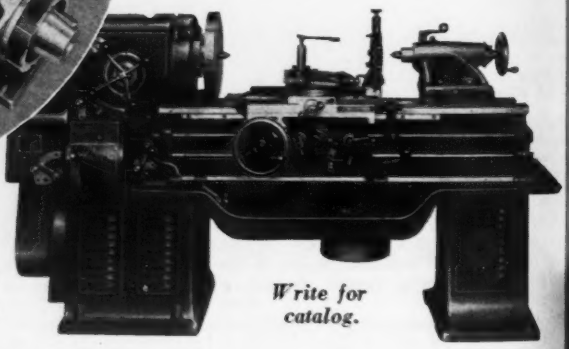
Grinder, designed for use with precisi bench lathes. The tool is powered by ⅛ h.p. universal motor, operating 25-60 cycle A.C. or D.C. The mot armature is dynamically balanced a mounted on closed type precision b bearings which are fully protected.

The grinding spindle is mounted precision ball bearings with textalite r



All-Herringbone Transmission
Only in Sidney Lathes

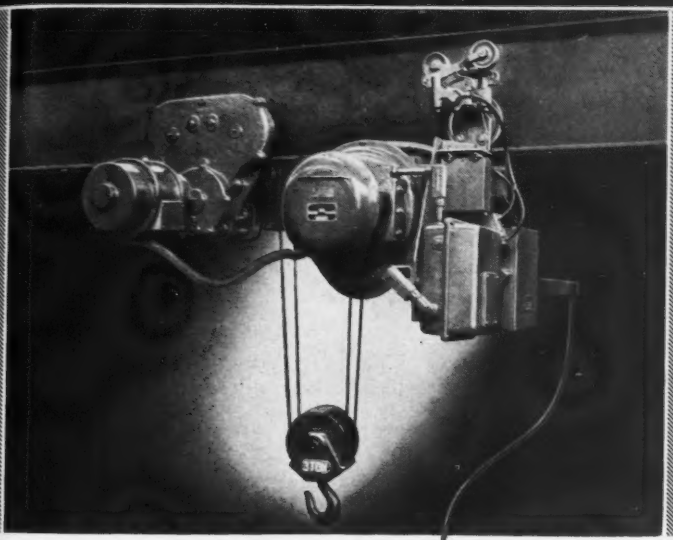
An all-herringbone transmission, composed of 12 continuous-tooth gears, completely eliminates all gear tooth or tool marks from the work. Controlled by Monotrol (1 dial) or Tritol (3 levers). Sizes 14" to 24".



THE SIDNEY
MACHINE TOOL CO.
210 Highland Ave.
Sidney, Ohio

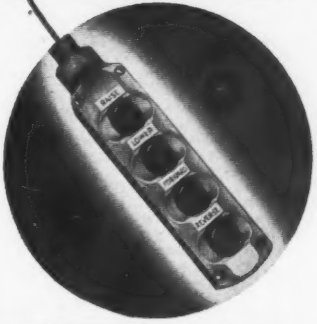
Write for catalog.

P&H HEVI-LIFT HOISTS



Variable Speed Control *with* PUSH-BUTTON

Now, you can have all speeds for lifting, lowering or moving loads with P&H Hoists centralized in one simple push-button control—shown at right. Operator can speed up or slow down movements entirely by button pressure. It assures careful handling of parts on and off machine—increases efficiency on a wide variety of work. For full details, write the Harnischfeger Corporation, 4535 West National Avenue, Milwaukee, Wisconsin.



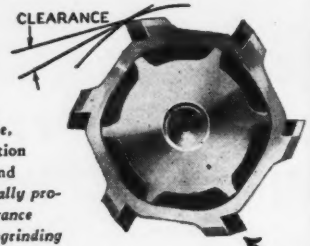
HARNISCHFEGER
CORPORATION
HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

Announcing - -

an amazingly economical, simplified type

EXPANSION REAMER

The STAPLES Carboloy-tipped reamer gives you the quality performance of a solid reamer (smooth finish and accurate duplication of hole sizes) *PLUS* the economy of an expansion reamer. You get *parallel* expansion of tips and *equal outward* expansion of tips. Clearance is *automatically* provided during the simple, rapid, resizing operation. Adjustments can be held to 0.0001".



One simple, fast operation re-sizes, and *automatically provides clearance without regrinding*

Exclusive feature gives you free cutting action, unusually long reamer life, and eliminates re-grinding after each expansion. One plant reports 26,000 pieces in X-1315 steel compared to 3,000 pieces with H.S.S. Another reamed 105,000 cylinders without re-sharpening. Equally economical on wide variety of work. Get the facts on this "free-est" cutting, longest-wearing reamer ever introduced.

May be purchased from Carboloy Co., or direct—

STAPLES TOOL & ENGINEERING CO.
Cincinnati, Ohio

✓ *WRITE FOR FOLDER*

STAPLES

tainer, and has a tapped hole in the end to accommodate the threaded shank mounted wheels. Two belts and four pulleys provide for six speeds; 10,000, 15,910, 19,000, 24,000, 34,500, and 50,000 r.p.m. These speeds are available for use with ⅛, ¼ and ½-in. diameter by ¼-in. wheels with ⅛-in. threaded shank with ¾ x ⅛ x ⅛-in. mounted wheels and 2 x ⅜ x $\frac{1}{16}$-in. grinding wheel.

The minimum distance from mounting base to center of grinding spindle is ¼ in., which makes it possible to use this grinder on the smallest bench lathes manufactured. For external grinding the spindle extends ⅝ in. from the end of the housing and with the Thomas Pencil Wheel for internal grinding, has a reach of 1⅜ inches.

Lufkin Hold Downs

The Lufkin Rule Co., Saginaw, Mich., announces the addition of Lufkin Hold Downs to its line of machinists' or precision tools. The hold downs are intended for use where other methods of clamping are inconvenient. They are especially handy for holding thin work.

The hold downs not only clamp the work securely, but also constantly force

Lufkin Hold Downs

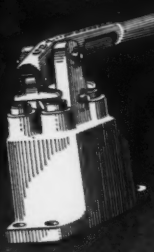
it downward against parallel or machine bed, because both contact edges are properly tapered and a clearance step is provided along the entire length of the front of the underside.

The hold downs are of steel, hardened and ground, and are made in five lengths of 2, 3, 4, 5, and 6 in. All sizes are of the same width and thickness so that any of the lengths can be used together on long work. They are sold in pairs and are known as Nos. 902A, B, C, D, and E.

Schraner Model B Crankshaft Lapping Machine

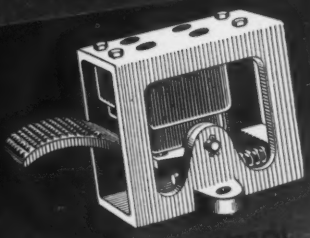
The illustration shows the Model B Crankshaft Lapping Machine now being

ROSS *Air Control* VALVES *are* STURDILY BUILT



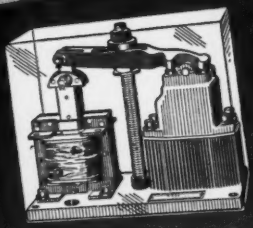
HAND CONTROL

All working parts made of hardened steel to give maximum service. Poppets of non-corrosive metals with oil resistant rubber seats, offer long life.



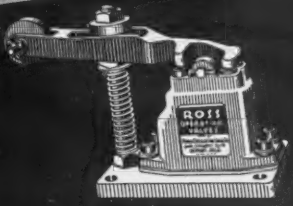
FOOT CONTROL

Bracket or frame is a heavy casting which will stand up under the roughest sort of handling. Foot treadle is overweight for extra strength.



SOLENOID CONTROL

Oversize solenoid for unfailing service. Extra heavy base for mounting purposes. Heavy pressed metal protecting cover. Overweight lever and links to meet severest demands.



MECHANICAL CONTROL

Spring and spring rod are bigger than for extra strength. Hardened roller for maximum wear. Heavy base to meet extreme demands.

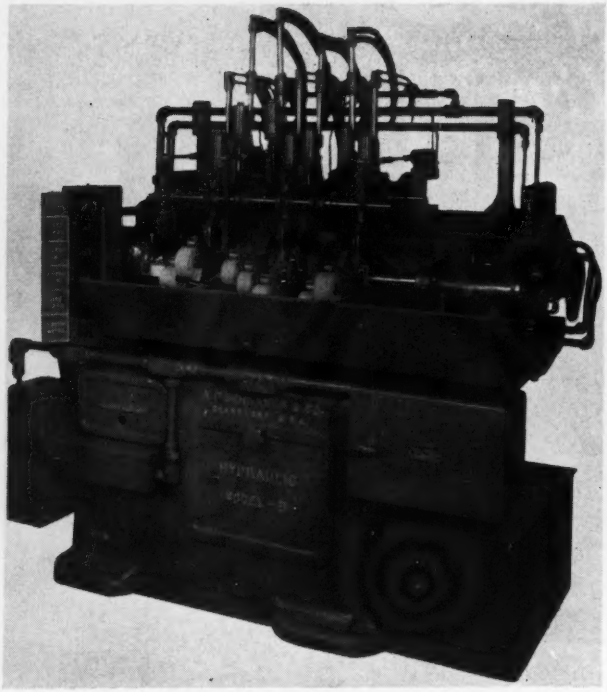
E BRIDLE FOR
IR HORSEPOWER

REGARDLESS of type or size, or the use to which they are put, Ross valves are all fundamentally alike, all sturdily built. Heavy bronze cast body with walls much thicker than usually considered necessary, each individual part designed with an extra strength factor which provides many years of dependable service—under severest conditions. For that unfailing service install Ross valves on your air-actuated equipment.

Send for Catalog No. 37

ROSS OPERATING VALVE COMPANY

6484 Epworth Boulevard • Detroit, Michigan



Schraner Model B Crankshaft Lapping Machine

produced by A. P. Schraner & Co., Cleveland, Ohio. This machine laps all main bearings simultaneously and, when necessary, can be adapted to include side walls of thrust bearings and oil slinger grooves. It is entirely hydraulic with push button control.

With the hydraulic arrangement, in addition to greatly increased speeds of rotation and oscill tion of the wor there is a possibili of increased pressu and absolute contr of pressure of t abrasive against t work. These featur result in increase production and fin finish.

The lapping mediu consists of abrasiv paper, held in attac ments which mak possible fresh, clea abrasive for ea crankshaft. These a tachments consist metal shoes which a bored to the require diameter for holdin abrasive pape against the bearing be lapped. A speci grade of abrasive pa per is used for thi purpose. The pape attachments are ar ranged with bracket to carry fifty yar rolls of abrasive, an with mechanisms fo automatically feedin in new and removin old paper. The aver age width of new pa per per bearing fo each crankshaf is from 1 to 1½ in. With this arrange ment, each crankshaft is lapped unde exactly the same conditions and uniform results are produced in continuous pro duction.

This method also ensures the perfect finish of the bearing to the extreme end and, when required, the possibility o adjustments to include fillets. Depend

ILLINOIS G & M COMPANY

Gears for Every Purpose

The most approved type of equipment and skilled craftsmen of our large modern works ensures you of a complete gear service of highest quality. You can always depend upon prompt deliveries.

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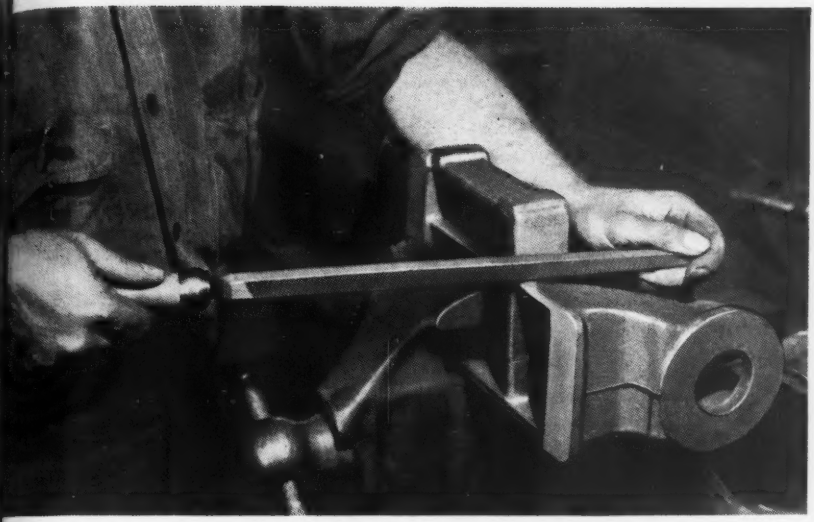


The Rugged NICHOLSON FOUNDRY FILE

For Rough Usage!

OFFERS THESE ADVANTAGES

Strong, low rugged teeth to withstand hard usage on rough castings; resist shelling off or breaking out.

Wide usefulness, removing fins, sprues, and other projections from hard castings; filing dies, narrow edges, sharp corners and ridges.

Tempered tang that won't snap off under hard pressure—a safety feature plainly visible on our files.

Here's another product of Nicholson File Company made to do a specific job better, faster and longer. The Foundry File was designed by us several years ago to meet extremely difficult filing conditions. It is a tool of many uses, with a place wherever a file must take rough usage and abuse.

Study the advantages of this file — think of the many places in your plant where these files can save time and money. Your jobber will supply you. Nicholson File Co., Providence, R. I., U. S. A. Canadian Plant, Port Hope, Ont.

Regularly furnished in Bastard Cut, sizes 8" to 18", in Flat, Half Round, Round and Square. Same number of teeth per inch as regular files.

A FILE FOR EVERY PURPOSE

NICHOLSON FILES

PIONEERS IN QUALITY PRODUCTION

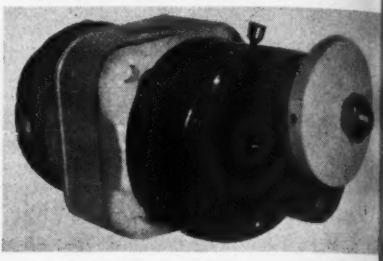
75-th ANNIVERSARY YEAR

ing upon the conditions, production varies from 45 to 60 shafts per hour. Interchangeable stone holders can be supplied if desired. The machine is also designed for maximum flexibility with respect to change-over in order to meet changes in crankshaft design.

Portman Precision Geared Head Motors

A line of precision-built geared head motors has been placed on the market by the Portman Machine Company, 2236A Bathgate Ave., New York, N. Y. The motor is designed for industrial uses where a compact motor and spindle head in one unit assembly can be utilized to advantage as a direct power head drive in various applications.

The built-in precision spindle unit of the motor is an exclusive design featuring an off-set shaft of the parallel type in a gear housing of compact design, resulting in complete motor frame clearance for widest adaptability. The spindle is of the precision type and is mounted on Fafnir Duplex type preloaded bearings for maximum rigidity and precision performance under extremely heavy axial and thrust loads. In addition, the spindle is driven through oversize helical gears of wide face for quiet positive operation. The spindle and gear

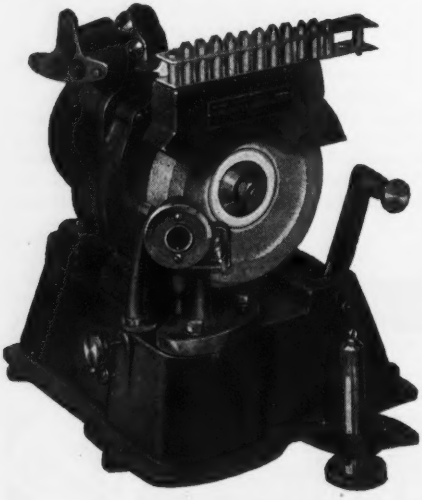


Portman Precision Geared Head Motor

housing incorporates integrally built-in seals completely protecting the entire assembly against dirt, dust abrasives, oil, acids, moisture, and all foreign matter.

The motor is available in sizes from 1 to 5 h.p. for various current requirements, and with standard spindle speeds of 1,150, 1,725, 2,300, 3,450, and 5,600 r.p.m. Spindle nose ends of various types

SIMPLE, FAST AND ACCURATE DRILL GRINDING



with a

BLACK DIAMOND PRECISION DRILL GRINDER

• **the only drill grinder that will grind your small wire gage and fractional drills accurately. It holds the drill in a fixed position while making a complete revolution. It grinds the lips exactly the same length, gives the drill the proper angle and clearance to insure easy cutting.**

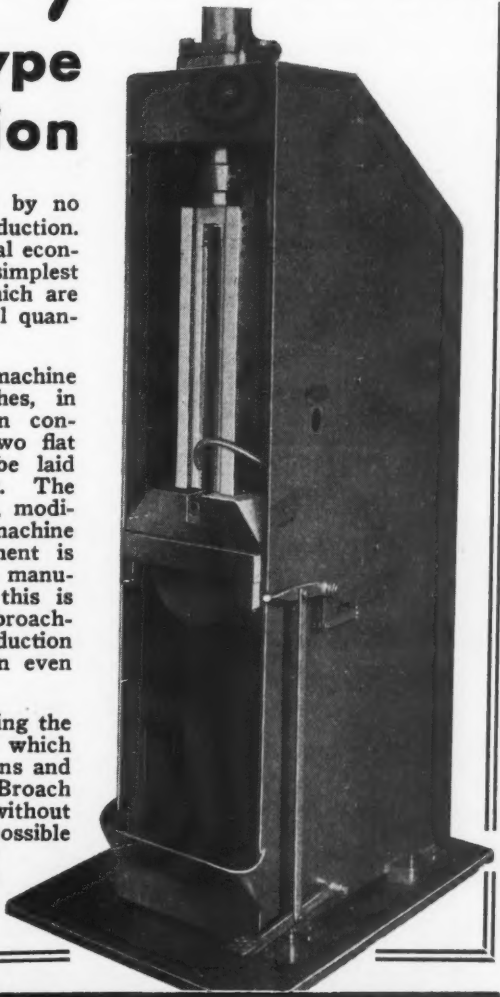
The only machine which will give this precision grinding on any size drill from No. 60 wire gage to 11/32" fractional without complicated adjustments. No. 1 grinds 1/8" to 1/2". No. 3 grinds 1/4" to 3/4".

Write for Bulletin No. 121

BLACK DIAMOND SAW & MACHINE WORKS, INC.

45 NORTH AVE • NATICK, MASS.

Broaching Has A Place In EVERY Type Of Production



BROACHING operations are by no means limited to high production. In the smaller plants, exceptional economies can be effected by the simplest methods of broaching parts which are produced in comparatively small quantities.

The illustration shows a machine equipped with Detroit Broaches, in which the broaching operation consists only of the cutting of two flat parallel surfaces. Parts can be laid in position without clamping. The broaches are of an inexpensive, modified keyway type. Used on a machine of this type the total investment is well within the budget of any manufacturer. Equipment such as this is adaptable to a wide range of broaching operations that make production simpler and more economical in even the smallest shops.

Don't be hesitant in investigating the possibilities of broaching parts which you manufacture. The suggestions and recommendations of the Detroit Broach engineers are offered to you without obligation. It's more than possible that they can show you how broaching will overcome many of *your* production weaknesses. Why not write TODAY?

DETROIT BROACH COMPANY

6000 Beniteau Ave. • Detroit, Michigan

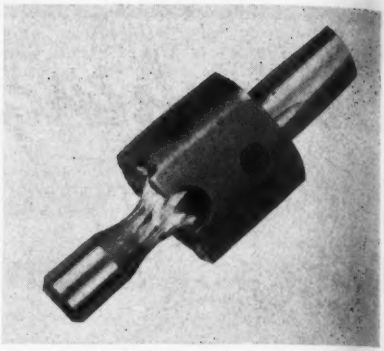
and keyway, threaded shaft ends with nuts and standard or special collars, Morse taper, and chuck type spindle ends.

Numerous applications for which the motor is intended include direct drive power heads for mounting as grinding, buffing, lapping, and polishing units; drilling and internal grinding heads; as power head units for abrasive cutting of metals, tile, stone, marble, and so on; tool and cutter drive heads, mixing, and impeller drives, pumps, and other similar applications.

The design and structural details of the motor include such features as glass insulation for high temperature ratings and compact frame sizes for power ratings. The motor is of the completely enclosed type, is externally fan cooled, and is intended for use under all extremes of severe service and adverse application conditions.

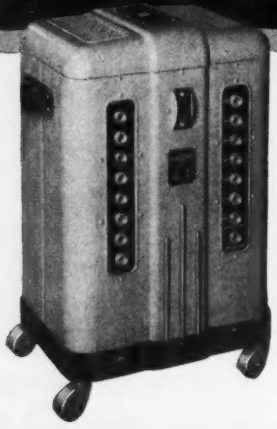
Severance Chamfering Tool

A tool for chamfering tubing both inside and outside, and facing the end at the same time, has been placed on the market by the Severance Tool Mfg. Co., 1516 E. Genesee Ave., Saginaw, Mich. The facing cutter of the tool is removable for regrinding independent of the chamfering members. The tool is provided with a pilot for guiding the tubing into the cutter centrally, and a milled groove gives chip clearance in the front face. This type of cutter may also be used to burr the ends where slots, keyways or splines are present.



Severance Chamfering Tool

Now! YOU CAN AFFORD an A.C. ARC WELDER



The MARQUETTE A.C. ARC WELDER

is moderately priced at $155, $195, $225 and $242.50 for the four models. In addition, A. C. Arc welding is by far the best and cheapest method of repairing or fabricating metal parts. It produces strong, dense ductile welds at low cost. If you are welding with an old machine, you can cut your costs with a MARQUETTE. If you are planning to buy a new welder, be sure to investigate the advantages of a MARQUETTE. Marquette A. C. Arc Welders are listed by Underwriters' Laboratories, Inc.

FOR COMPLETE DETAILS WRITE DEPT. E

MARQUETTE MANUFACTURING CO., Inc. MINNEAPOLIS MINNESOTA

New! the "JUNIOR"

A Colonial Press for less than . . . $500

Above: Size Comparison with Colonial Open Side Utility Broaching Press

"JUNIOR" DATA

Capacity	½ ton
Stroke	10 in.
Height	31 in.
'Floor' Space	12 x 22 in.
Platen	8 x 12 in.
Clearance	5 in.
Weight	750 lbs.

Complete in every detail . . . Streamlined design with built-in 1 h. p. motor . . . 1000 lb. hydraulic pressure system and controls . . . Adjustable stroke.

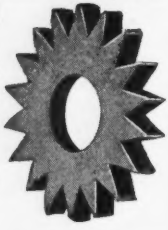
Mount it on a bench for miscellaneous assembly work . . . for all kinds of light broaching jobs . . . Mount it anywhere for pressing parts on arbors . . . Quick delivery.

COLONIAL BROACH COMPANY 147 JOS. CAMPAU DETROIT, MICHIGAN

To get real performance from your grinding wheels, they need a good dressing regularly.

The best way to be sure the job is done right, is to use New Improved Vincent - Huntington dressers with bushings that can't turn and wear out the bearing holes in the handle.

These new type Huntington dressers, equipped with cutters heat treated by the "Vincent Process" to the proper degree of hardness and toughness, is your assurance that the dressing will be well done. Call your nearest Mill Supplies distributor. Insist on the dressers with the aluminum finish.



Write for descriptive catalog sheets

VINCENT STEEL PROCESS CO.

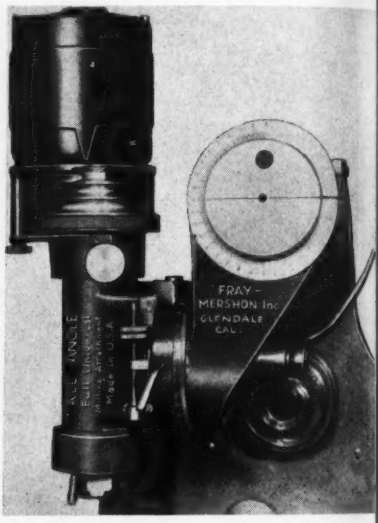
2434 BELLEVUE AVENUE

DETROIT • MICHIGAN

"If it's a Huntington dresser or cutter Vincent makes it."

"All Angle" Full Universal Milling Machine Attachment

An "All Angle" Full Universal Milling Machine Attachment of simple and versatile design has been brought out by Fray-Mershon, Inc., Glendale, Cal. The attachment is available in two types, A and B. Type A does not have spindle travel or depth stop, while Type B has



"All Angle" Full Universal Milling Machine Attachment

a spindle travel of 4 in., depth stop, and a 4-in. scale.

The Type B attachment is of gib-type construction employing a rack and pinion, and has a hand feed with which the entire spindle housing can be fed 4 in. in any direction according to the set-up of the attachment. An adjustable friction lock positively locks the spindle housing while performing stationary milling or other stationary operations. The hardened and ground chrome molybdenum spindle is available in diameters of $\frac{7}{8}$ to $1\frac{5}{8}$ in., and rotates in two heavy-duty Timken bearings contained in the spindle housing.

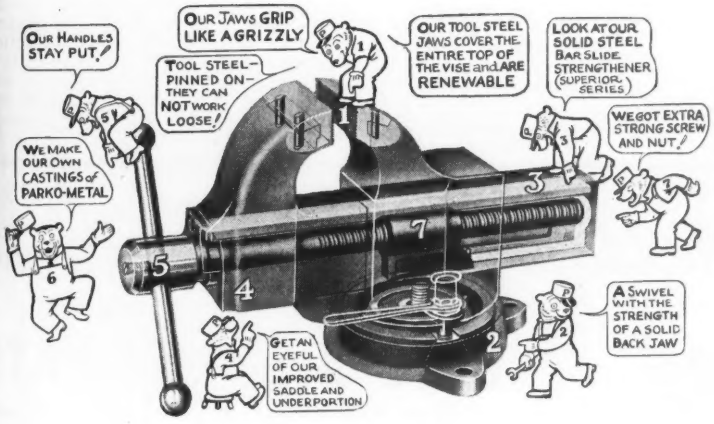
The Type A, which is belt-driven, is said to be particularly adaptable as a high speed production tool and does not operate at speeds slower than 600 r.p.m. with a maximum speed of 4,800 r.p.m. Both Type A and Type B can be fur-

1832 **107 YEARS** 1939

OF

VISE MANUFACTURING EXPERIENCE

Skilled craftsmen with 107 years of knowledge back of them, are responsible for many improvements that have added years of service to PARKER VISES.


OUR HANDLES STAY PUT!
OUR JAWS GRIP LIKE A GRIZZLY
TOOL STEEL-PINNED ON-THEY CAN NOT WORK LOOSE!
OUR TOOL STEEL JAWS COVER THE ENTIRE TOP OF THE VISE and ARE RENEWABLE
LOOK AT OUR SOLID STEEL BAR SLIDE STRENGTHENER (SUPERIOR SERIES)
WE GOT EXTRA STRONG SCREW AND NUT!
WE MAKE OUR OWN CASTINGS of PARKO-METAL
A SWIVEL WITH THE STRENGTH OF A SOLID BACK JAW
GET AN EYEFUL OF OUR IMPROVED SADDLE AND UNDERPORTION

CATALOG No. 60 EXPLAINING IN DETAIL THESE FEATURES WILL BE FORWARDED ON REQUEST.

THE CHARLES PARKER CO.

MERIDEN • CONN.

nished with a back gear unit if desired. The back gear unit is especially suited for use in the operation of large end mills, reamers, boring bars, or other tools where slow speed operation is most essential. Slowest operating speed with the back gear unit is 150 revolutions per minute.

Once installed on the milling machine overarm bar, the "All Angle" attachment can be swung upward and back against the face of the mill completely out of the way, and, therefore, will not interfere with the use of the mill for any other purpose. The entire attachment is suspended from the overarm bar in such a manner that it can be swung over and around the work, and thus permit operation at or from any angle. According to the manufacturer, any compound angle can be obtained in less than one minute.

The Fray-Mershon "All Angle" Full Universal Milling Machine Attachment is supplied complete with an adapter to fit the milling machine overarm and a ½ h.p. motor. A reversing switch can be furnished if desired.

MARKING DEVICE

Manufacturers For Fifty Years

BRASS CHECKS

SACKMANN STAMP & STENCIL CO.

74 W. EXCHANGE ST. AKRON, OHIO.

METAL BADGES

STEEL STAMPS LETTERS & FIGURES

AS GOOD AS THE BEST

"Modern" Bronze Pushers

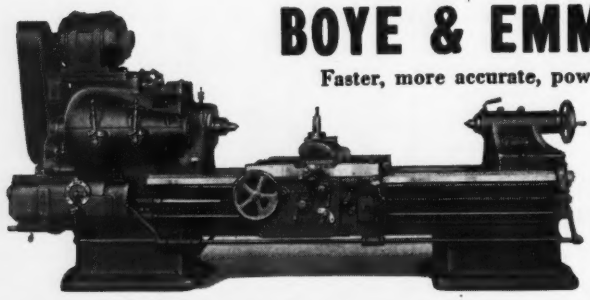
The Modern Collet and Machine Company, 401 Salliotte St., Ecorse, Mich., announces that its standard design pushers are now available in special bronze, which is said to make them ideal for any work where scratching must be eliminated. The bronze pushers are the result of the recent development of a bronze which will retain, at all times, the proper spring tension necessary for correct feeding. Being a friction-reducing metal, the bronze is said to eliminate the scratching which is caused by friction between the surface grip of a steel pusher and the steel stock.

Announcing the Newly Designed

Model "E"—24-inch

BOYE & EMMES LATHE

Faster, more accurate, powerful and convenient.



Write for complete detailed specifications.

THE BOYE & EMMES MACHINE TOOL CO.

CINCINNATI OHIO

Ettco - Emrick

"EVERY PART IN STOCK EXCEPT THE HOLES"

MULTIPLE SPINDLE TAPPING AND DRILLING HEADS

A STANDARDIZED SYSTEM

ETTCO MULTIPLE HEADS are manufactured. Hundreds of cases — thousands of gears are in stock.

Delivery service is at times, within 24 hours.

They are made up of interchangeable units. The utimate cost of the heads is the lowest of any made.

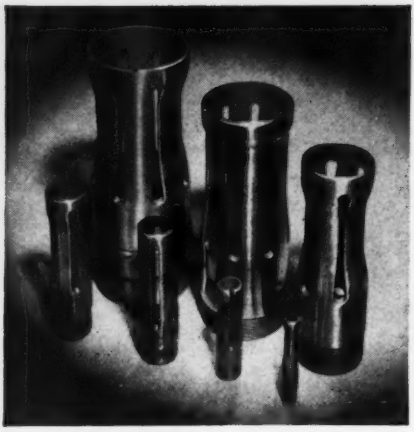
Your manufacturing is 100 to 500% faster—and a better job.

+ EMRICK SERVICE.

We specialize in fine intricate jobs, down to No. 60 drills or No. 1 taps. Let us have a drawing for a quotation—Even this is standardized with printed costs.

ETTCO TOOL CO.

594 JOHNSON AVE. BROOKLYN, N. Y.



"Modern" Bronze Pushers

All of the features of the patented "Modern" Pushers are retained in the bronze type. The pushers make possible reduced tool inventories, only one pusher being needed for round and hexagon stock, and one for round and square stock. "Modern" Pushers have a long, flat surface grip. They can be tightened, when they become loose through wear, to any desired tension without the aid of special tools.

Lincoln "Readyweld" Electrode for A.C. Transformer Welders

An arc welding electrode for use with A.C. transformer type welders which have low open circuit voltage has been placed on the market by The Lincoln Electric Co., Cleveland, Ohio. The electrode, to be known as "Readyweld," is a low-carbon steel rod with a heavy extruded shielded arc coating possessing properties which are said to assure arc stability and easy restriking of the arc with small low voltage transformer welders. Readyweld is intended for general welding and repair work on light gage sheet steel and provides weld metal which is said to possess high strength and ductility.

Although designed primarily for use with A.C. transformer welders of low open-circuit voltage, Readyweld is also claimed to operate efficiently with D.C. negative plants. It is manufactured in $\frac{5}{32}$-in. diameters, 12-in. lengths, and is packed in 25-lb. containers.

Machining Modern Metals Requires Modern Tool Grinding Equipment

You can materially reduce your Drill-tool and cutter costs by installing OLIVER OF ADRIAN

Drill Grinders
Cutter Grinders
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Model 510 Drill Grinder for ¼ to 3" drills. Automatic operation—Variable clearances—Variable point angles.

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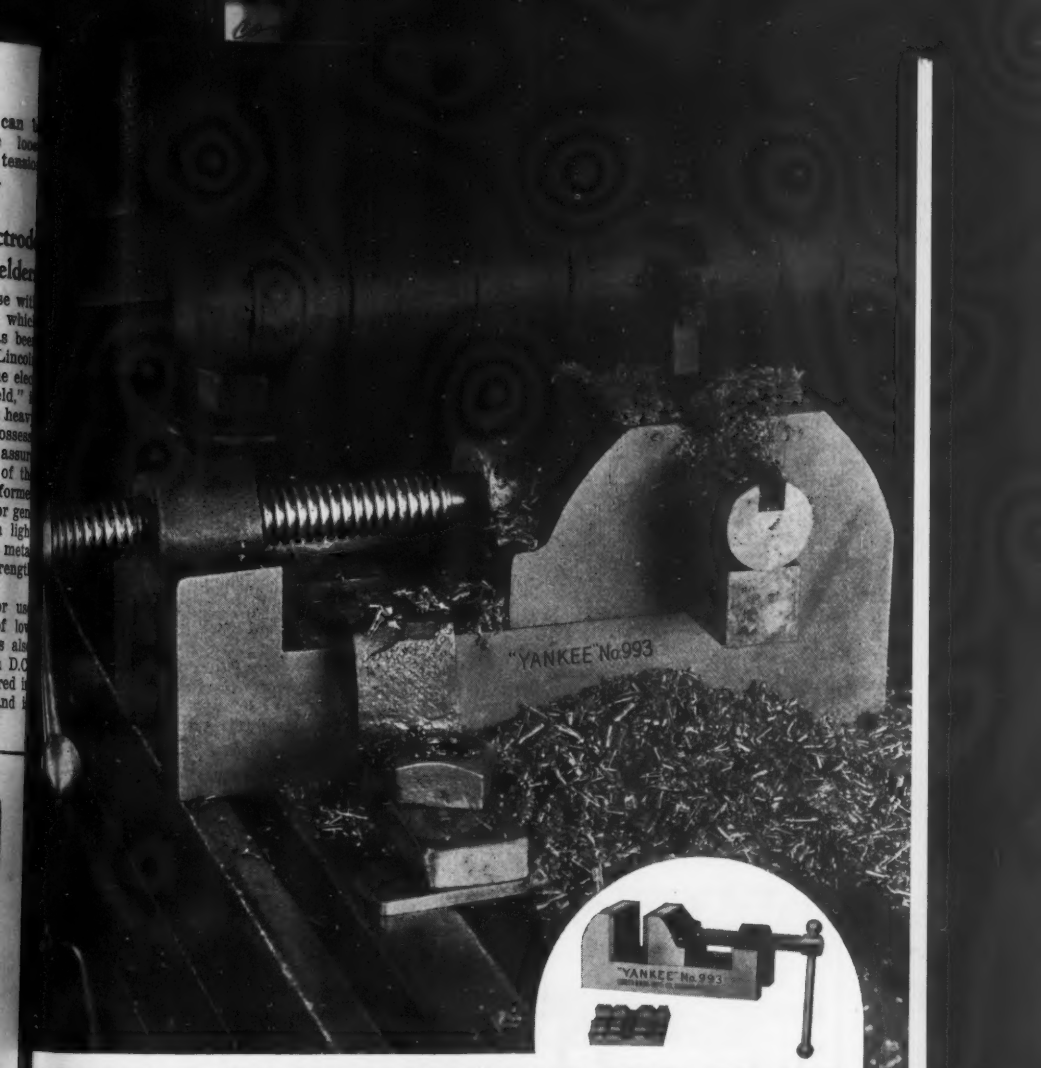

"YANKEE" VISE

SPEEDS PRODUCTION

"Yankee" is a *fast-production* vise—different from any other vise in your shop! Squared all sides. Designed for continuous work—from bench to machine and back again—accurate results and no delay. "Yankee" Vise illustrated above, made in four sizes: No. 991, 1½" jaw width. No. 992, 2" jaw width. No. 993, 2¾" jaw width. No. 994, 4" jaw width. Hardened steel block, V-grooved, supplied for holding rounds.

"Yankee" Vise also available with removable swivel base. Sizes, Nos. 1991, 1992, 1993 and 1994.

ASK FOR IT FROM YOUR SUPPLY HOUSE. FOR "YANKEE" VISE CIRCULAR, WRITE NORTH BROS. MFG. CO., DEPT. MS, PHILADELPHIA, U. S. A.

B & S Nos. 220 and 240 Centrifugal Motorpumps

(Left)—B & S No. 220 Centrifugal Motorpump. (Right)—B & S No. 240 Centrifugal Motorpump.

Two centrifugal motorpumps designated as the Nos. 220 and 240 have been added to the line of pumps manufactured by the Brown & Sharpe Mfg. Co., Providence, R. I. The pumps are suited for supplying coolant to machine tools and light machinery, for use where dirt or abrasive is present in the liquid, and for light transfer work. They supply a moderate volume of flow at a low head, and can be furnished with motors of various electrical characteristics.

The No. 220 centrifugal motorpump is designed for operation with the impeller below liquid level. It can be mounted either horizontally or vertically, preferably with the motor above the pump. A mechanical seal which requires no adjustment prevents shaft wear and leakage of liquid. The discharge port can be positioned at any 90 deg. angle with respect to the motor by simply shifting the pump assembly on the motor end bell.

The No. 240 centrifugal motorpump is similar to the No. 220 except that it is designed for flange mounting integral with the pump and does not require inlet piping. It is intended for mounting in a vertical position, but can be mounted horizontally if desired. The discharge port of the pump can be

"HALLOWELL" SHOP EQUIPMENT

Its steel construction gives it greater strength and longer wear . . . . yet it keeps its price at present day levels.

Fig. 732
Pat'd and Pats. Pending
Drawer is extra.

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Popular everywhere is this bench because of its rigid steel construction, a top that stays smooth as a surface plate and its really low price. Over 1300 combinations make certain your needs can be met. Catalog?

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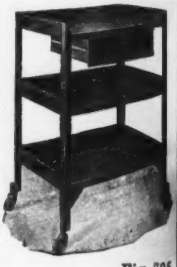

Fig. 705

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BOX 556

BRANCHES CHICAGO ST. LOUIS SAN FRANCISCO

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WELLS Metal Cutting Band Saws will save YOU production dollars — their fast, accurate cutting means less time — better results. Their easy portability makes them the ideal tool for most every plant sawing purpose. Upkeep costs are negligible — their carefully built parts resist wear to a remarkable degree. Write us today for full particulars—you'll be surprised at the advantages a Wells saw offers.

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WELLS METAL CUTTING BAND SAWS

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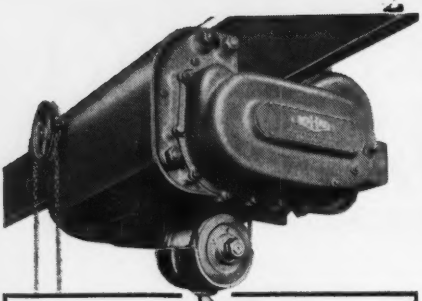

Accurate "Spotting" requires a

HAND-GEARED TROLLEY TYPE

A-E-CO LO-HED HOIST

When—1. The haul is short and load heavy or awkward. 2. The load must be accurately spotted, regardless of weight. 3. The load, because of its nature, must be carefully moved (chemicals, hot foundry ladles, etc.)—

The hand-geared trolley type A-E-CO Lo-Hed hoist—the one operated by a chain is the logical choice.

For high-lights of this hoist see A-E-CO POINTS (below). For full details of Lo-Hed hoists, send for our new catalog today.

A-E-CO POINTS

- Available in capacities from ½ to 6 tons.
- Operates on Standard I-beam or track of any make.
- Low headroom—stacks materials higher than any other hoist.
- Safe, fool-proof.
- Compact, strong, simply constructed.
- Protected against dust, moisture, fumes.
- Heavy duty, ball-bearing HOIST MOTOR.
- Automatic lowering brake.
- Ball or roller bearings at vital points.
- Improved plow-steel cable.
- 100% positive automatic stop.
- Efficient spur-gear drive . . . and

LO-HED COSTS LESS PER LIFT

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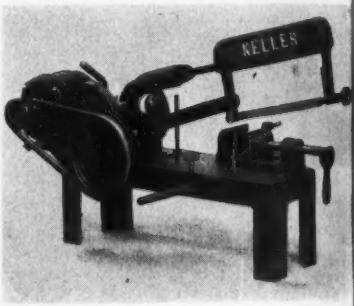
OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES • HELE-SHAW FLUID POWER

shifted to any 45 deg. angle with [illegible] intake or suction.

The compactness of the B & S N[illegible] 220 and 240 Centrifugal Motorpumps a[illegible] the wide range of their installation p[illegible] sibilities make them particularly ada[illegible] able as standard machine equipm[illegible] and for installation in places wh[illegible] space is limited or power take-offs [illegible] not readily available.

Keller Portable Power Hack Saw

The Keller Power Hack Saw, now [illegible] ing marketed by Sales Service & Ma[illegible] facturing Co., 3405 45th Ave. Sou[illegible] Minneapolis, Minn., is built to fill [illegible] need for a light, sturdy, portable ha[illegible] saw which can be moved to the [illegible] without difficulty. The power saw c[illegible] be removed from the stand and set [illegible] a bench, if desired, as the weight [illegible]



Keller Portable Power Hack Saw

the saw is only 125 lbs. with the moto[illegible] and without floor legs.

The saw uses a 10-in. blade and ha[illegible] a capacity of 4 x 4 in. Two speed[illegible] are available through a vee-belt and tw[illegible] step pulleys. The machine makes 70 [illegible] 125 strokes per minute and the leng[illegible] of the stroke is 4 in. The tool is pow[illegible] ered by a ¼ h.p., 750 r.p.m. motor.

The vise swivels to 45 deg. angl[illegible] at which angle the capacity is 3 i[illegible] The vise can be moved ahead so th[illegible] all parts of the blade are complete[illegible] used before discarding. The base an[illegible] frame are of steel and all joints ar[illegible] welded, providing sturdy construction[illegible] Gears are of semi-steel, precision cu[illegible] Either hand or power blades can be use[illegible] and the machine is designed so tha[illegible]

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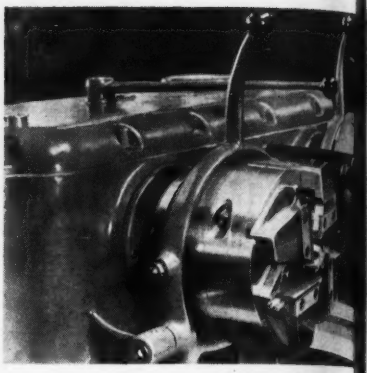
gravity feed with lift on the reverse stroke to ensure longer life of blades. Weight, complete with motor, approximately 200 pounds.

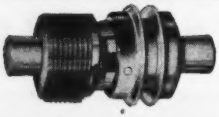
Landis Semi-Receding Head for Cutting Tapered Threads

The Landis Machine Co., Waynesboro, Pa., announces the development of a new method for the cutting of tapered threads with Landis Pipe and Nipple Threading Heads. The new principle of threading incorporates a number of changes in the design of the present threading head, but these changes do not effect the outward appearance of the head. The operating mechanism within the head has been redesigned so that as the die head advances under cut, the end of the work will contact the reamer and thus cause the chaser to recede to produce a tapered thread. This receding action does not commence until after the first two or three threads are formed. Thus the term "Semi-Receding" is used. The reamer mechanism is used to establish the total thread length, and since the reamer mechanism is in no way connected to the size adjustment mech nism, it is possible to adjust the head for size without effecting t thread length.



Landis Semi-Receding Head for Cutting Tapered Threads

By using the semi-receding acti rather than a full receding action, t necessity for using a leadscrew to pr pel the head forward is eliminated. T first two or three threads which a



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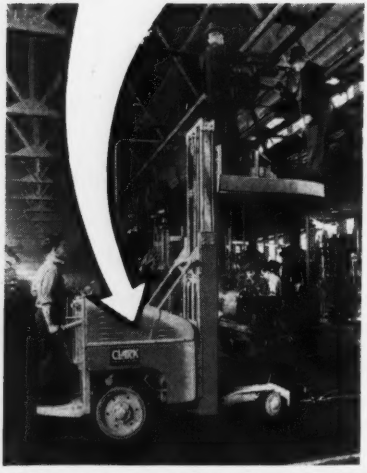

A No. 4 Pullmore drives the Clark Truck hydraulic lift; providing smooth, powerf lift control. Simple, compact, Pullmore Clutch fit readily into small space. Symmetrical, b anced, they operate perfectly at high spee Accurate construction from selected materi assures durability under long, hard servic Adjustments are easily made, seldom need Pullmore Clutches are specified in many kind industrial machines; are available single- double- type, for oil or dry operation, in capaci up to 75 h.p. Investigate. Write today for illu trated Pullmore Blue Book.

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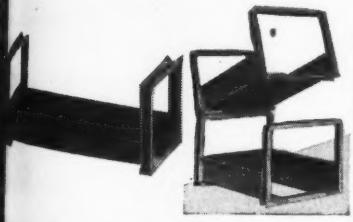


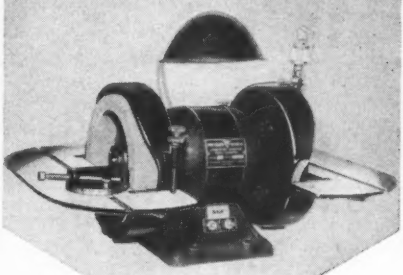
Pile boxes as high as you want—STACKRACKS keep every box in the pile instantly accessible. Boxes and tote pans slide in STACKRACKS like drawers—you can get at the contents of any one without lifting or moving any other box. Make heavy boxes as easy to handle as light ones. Patented STACKRACKS, to fit your boxes, interlock to form storage units of any size, shape or capacity.

Write today for full information and low prices. See how STACKRACKS can end your box storage problems. Stackbin Corp., 53 Troy St., Providence, R. I.

STACKRACKS

"STACKED AND STILL ACCESSIBLE"

PROSSER Cemented Carbide Tool Grinder



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This grinder removes metal fast when rough grinding and finish grinds smooth, keen cutting edges.

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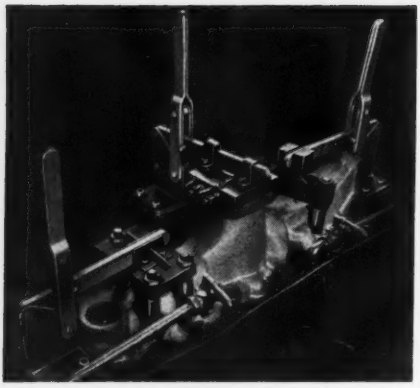

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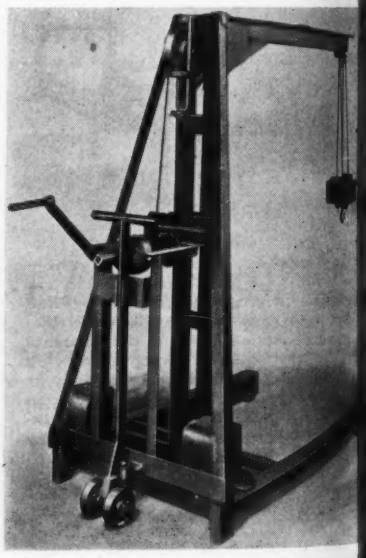
formed before the receding action gins to function are sufficient to p vide a lead-nut action for the cha and the manner in which the chas are applied to the head provides correct taper for the first two or th threads.

A much freer cutting action is obta able with the semi-receding head wh automatically reduces the cutting str as the head advances. The quality the thread produced is improved, t taper will be more accurate and power consumption will be much low This semi-receding feature is applica only to Lanco Internally Tripped P and Nipple Heads. Heads of this ty can be easily changed over to the se receding type.

Barrett-Cravens Portable Shop Crane

A portable shop crane, available either hand or electrical operation, h



Barrett-Cravens Portable Shop Crane

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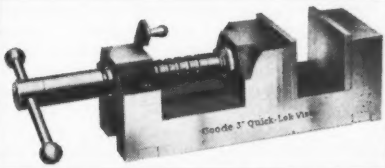

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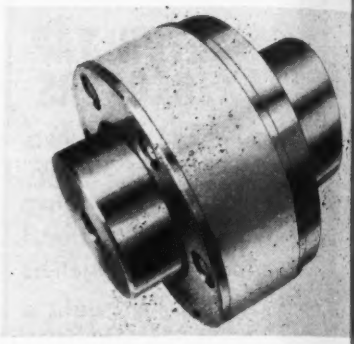
so on. The crane is of strong welded steel construction, and is available in capacities of from 500 to 5,000 lbs. with either fixed or revolving boom. The boom upright can be made rigid, hinged, or telescoped to provide for low overhead clearances or doorways. Any lifting height desired can be furnished.

According to the manufacturer, the Barrett-Cravens Portable Shop Crane saves time and reduces handling costs on hundreds of jobs such as lifting and transporting motors, gear reducers, and other heavy units, and holding them in position until they are bolted or welded in place. In handling stored materials, the crane reaches over the first, second or third row of piled material to place or pick up the desired work behind it.

The Barrett-Cravens Crane is mounted on roller bearing wheels which provide for easy moving even under heavy loads. When lifting or lowering, the the front wheels are raised so that the members supporting the upright boom contact the floor and thus provide a firm footing. The crane is "tailor-made" to meet existing conditions in any plant or for any given requirement.

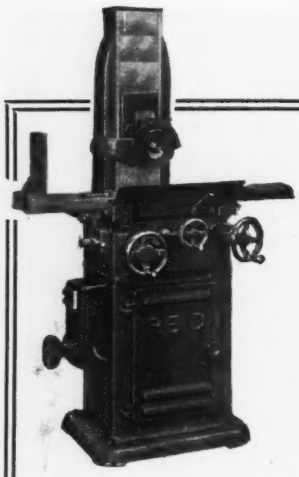
Morflex Radial Coupling

Morse Chain Company, Ithaca, N. announces the development of the M flex Radial Coupling in which specia



Morflex Radial Coupling

shaped patented rubber bushings a used to provide an effective flexing m dium for withstanding shock loads a resisting vibration. These rubber bloc are assembled radially, equally space



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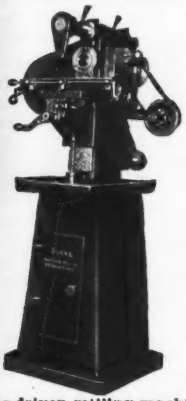

...ble motor driven milling machines, Nos. 1, ...1 and 4 are specially suited for handling ...all, difficult work on a production basis. *Write for complete information.*

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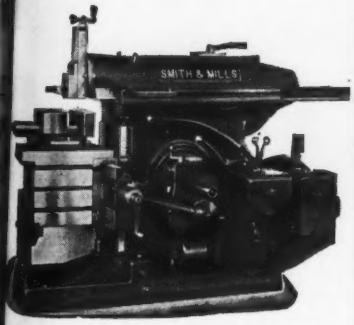

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Shepard Machine Co. of Cleveland, made this interesting shoe from 4" oil hardened tool steel on the DO-ALL in 5 hours. Former time for milling, shaping and boring the shoe was 3 days. Savings effected by the DO-ALL: 2 days and 3 hours, also the 26-pound slug.

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DO-ALL is a moderately priced, rugged, precision machine tool that replaces shaping, milling and lathe work on a large variety of jobs with enormous savings. The narrow saws are inexpensive and users say DO-ALL is the busiest machine in the shop.

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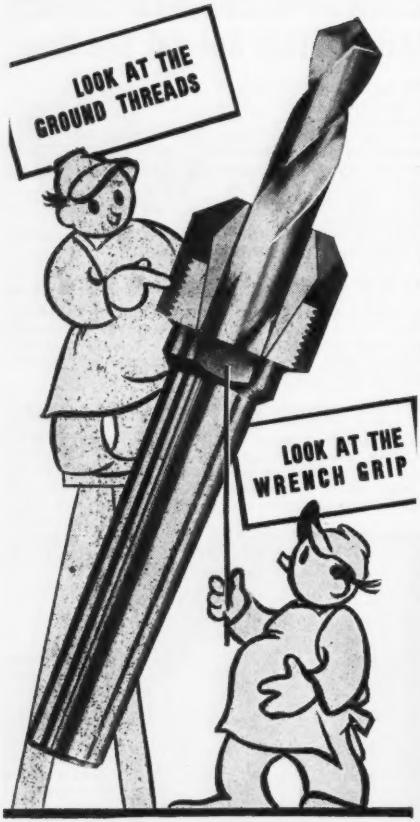

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COLLET CHUCKS
TWO NEW SIZES AND TWO NEW IMPROVEMENTS

Two new features of Universal Collet Chucks are (1) ground threads, and (2) a handy wrench grip on the shank. Two new sizes now offered are type O.W. from $\frac{1}{16}$" to $\frac{3}{16}$" and type XZ $\frac{3}{4}$" to 1$\frac{1}{2}$"

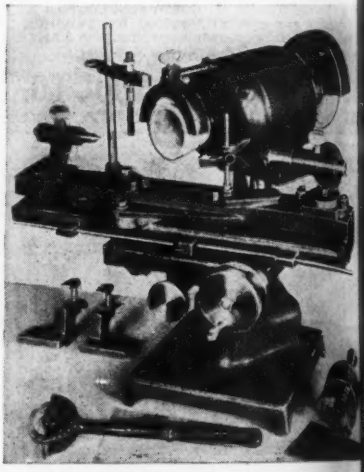
UNIVERSAL
Engineering Company
Frankenmuth, Mich.

on the steel pins of the yoke or h member. A two-piece metal hous encases the rubber blocks and also pr vides for attaching the compani flange to the unit. The entire coupli is machined to ensure perfect balan

Since there is no metal-on-me movement, the coupling is fully in lated against noise and electricity a requires no lubrication. The Morf Radial Coupling is made in vario sizes with capacity ratings of from to 37 h.p. at 100 r.p.m.

"Knockout" Universal Grind

The "Knockout" Universal Grind now being built by K. O. Lee & S Company, Aberdeen, S. D., is a co plete tool sharpening machine said be capable of efficient work on bo



"Knockout" Universal Grinder

large and small jobs. With this ma chine the manufacturer states that an reamer, cutter, die sinking or other too in its range can be satisfactorily sharp ened in a minimum of time and with minimum of skill on the part of th operator.

The ¼ h.p. 3,450 r.p.m. motor is care fully balanced, dust proof, and trouble free. It is mounted on a sturdy column which is adjustable for height by thou sandths and for swivel by degrees with a positive lock for setting. The wheel

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Quick — Quiet — Economical. Order now and enjoy the added efficiency and at the same time — save money.

HAVE THE SIZE YOU NEED WHEN YOU NEED IT

Set No. 1— 8 Drills—$\frac{1}{16}$" to $\frac{3}{4}$" with box....$42.75
Set No. 2—10 Drills—$\frac{1}{16}$" to 1" with box....$64.25
Set No. 3—12 Drills—$\frac{1}{16}$" to 1 $\frac{1}{2}$" with box...$97.25

A 6" x ½" x ½" silicon carbide grinding wheel will be supplied with each of these sets for $1.50 added cost.

PRICE LIST

Stock No.	Size In.	Lgth. In.	Shank Dia	Price Each
FD-1	1/8	2½	1/4	$3.50
FD-1-A	1/8	3	1/4	4.00
FD-2	1/4	3¾	1/4	4.00
FD-3	1/4	3¾	1/4	4.50
FD-4	5/16	4	1/4	5.00
FD-4-A	5/16	6	1/4	5.25
FD-5	1/2	6	1/4	5.50
FD-5-A	1/2	6	1/2	6.00
FD-6	5/8	6	1/2	6.50
FD-6-A	5/8	6	5/8	7.25
FD-7	3/4	6	1/2	8.00
FD-7-A	3/4	6	5/8	8.75
FD-8	7/8	6	1/2	9.50
FD-8-A	7/8	6	5/8	11.00
FD-9	1	6	1/2	12.00
FD-10	1¼	10	1	15.00
FD-11	1½	10	1	18.00
FD-12	2	10	1	23.00

SUPER TOOL COMPANY

23850 HOOVER RD. DETROIT, MICH.
Phone Arlington 1500

head is mounted high and the column can be adjusted to a height which will permit a 6-in. wheel to be used on a 5-in. form cutter. The wheelhead can be revolved in a complete circle.

A long knee provides ample adjustment for sharpening spiral reamers with an abrupt angle. The bottom table is provided with one vee and one flat way extending the entire length of the table. A spring hold down plate provides constant take-up for wear. The table is traversed through a rack and pinion with a 4 to 1 reduction gear. The compound table can be swiveled in a complete circle and is graduated by degrees and taper per foot. With the K-O Universal Center Gage, the center line of any tool or cutter is instantly determined regardless of the height from the table, so the tooth rest can be set accordingly. Vee blocks enable the grinding of reamers that cannot be handled between centers.

The distance between centers is 16 in. Swing over table, 5 in. Length of travel, 10⅜ in. Cross feed. 2½ in. Vertical feed, 5 in. Motor, ¼ h.p., 3,450 r.p.m., single phase, 60 cycle, 110 volt, A.C., ball bearing, totally enclosed. Net weight, 130 pounds.

Geometric Taper-Cutting Die Head

The Geometric Tool Company, New Haven, Conn., offers a complete line of Taper-Cutting Die Heads for use on hand-operated machines such as screw machines, turret lathes, and so on where a stationary die head can be employed. There is an obvious field for a taper-cutting die head, particularly with today's demand for tougher materials and greater accuracy. The Geometric Style CT Taper Die Head was developed to fill this demand after trying out several different designs in numerous plants over a period of several years.

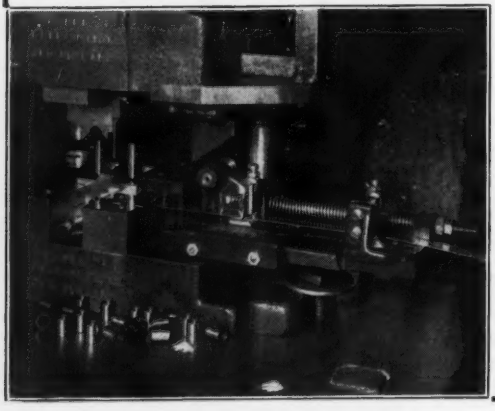
Some of the outstanding advantages of the Geometric Style CT Taper Die Head are: 1. Better controlled accuracy. The resultant taper is controlled by a positive cam. 2. Less power required. The chasers cut a taper thread just as a conventional die head cuts a straight thread, the chamfer and the first full tooth back of the chamfer doing all the work. 3. Greater length of taper can be cut without the use of projection chasers. The length of taper is not limited to the height of the chaser

DICKERMAN

HITCH FEED

For Quicker Set-ups on Short Runs

Accurate - Economical - Adaptable



The Hitch Feed is adaptable to any ordinary punch press without press alterations. It is built to feed from any position on any style die.

In cases where the Hitch Feed is permanently attached to the die-set, the set-up time of the die and Hitch Feed is no longer than that of the die alone.

Left: Dickerman Hitch Feed mounted in the usual right-hand position feeding a cut-off-and-form die.

Write for folder No. 84.

H. E. DICKERMAN MANUFACTURING CO.

284 WILBRAHAM RD.

SPRINGFIELD • MASS.

LAPPED and POLISHED
DIAMOND
BORING and TURNING
TOOLS

"V" Point

Offset

• For boring and turning all non-ferrous metals, bakelite, hard rubber, etc. Strong and keen cutting. Guaranteed to perform satisfactorily.

Write for prices and recommendations.

WHEEL TRUEING TOOL CO., Inc.
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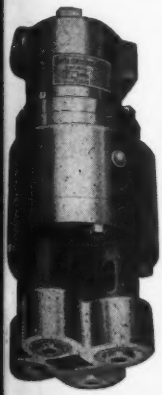
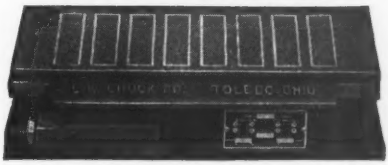
U. S. SPECIAL DRILL HEADS



U. S. Drill Heads are made in standard and special sizes. If your job requires special drill heads, our years of specialization in this work will save you money and assure an accurate dependable and swift job. Send your blue prints for estimates.

The United States Drill Head Co.
1354 Riverside Drive
CINCINNATI, OHIO

Best Values on the Market



Working Surface 5¾" wide, 13" long.
Consumes .5 Amp.

L-W MAGNETIC CHUCKS

Waterproof for wet or dry grinding

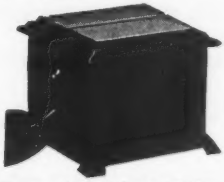
A REAL MAGNETIC CHUCK that is adaptable for any purpose. Unconditionally guaranteed to furnish the highest magnetic holding power on either 110 or 220 volt direct current. Well designed and beautifully finished, highest quality workmanship throughout—complete with cord and plug—an outstanding value..... **39.75**

Also made in the following sizes: 6½x18"—$53.50. 8x24"—$95.00. 10¾x37"—$175.00.

NEW-IMPROVED DEMAGNETIZERS

Model B-2
59.50

Complete with pilot light signal, switch and cord. Operates on 110 volt A.C. current. 7¾" wide, 12½" long, 6¾" high. Shipping wt. 55 lbs.



Model J-1
41.00

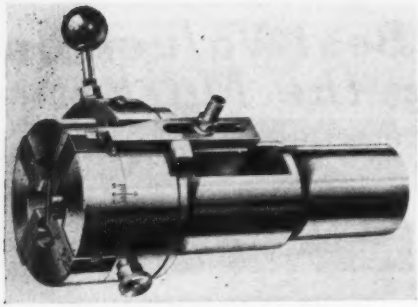
Complete with switch and cord ready for use. Operates on 110 volt A. C. current. 7¼" wide. 7¼" long. 6¾" high. Shipping weight 35 lbs.

To meet the demand for a Demagnetizer that would properly fill the requirements of taking the magnetism out of work that has become demagnetized through induction, we have designed and built two models for large and small work. A single pass over the stationary poles is sufficient to demagnetize the work completely.

L-W also manufacturers Power Saws, Lathe Chucks, Milling Machine Vises and Dividing Heads

Send for catalog of the complete L-W Line

L-W CHUCK CO.
20 N. ST. CLAIR ST. TOLEDO, OHIO



Geometric Taper-Cutting Die Head

as is the case with a jam cut. 4. No objectionable lines when the tool opens. 5. Steeper tapers. On tough materials—or any material for that matter—a better thread can be cut with less danger of chaser breakage. 6. Better threads; smoother and more accurate at a lower cost per thread.

The tools themselves are made of special alloy steels, hardened and ground for accuracy and long life. The simplicity of design makes it an easy matter to set up and operate these tools. The tools may be used either as inside trip die heads or as outside trip die heads.

Nine stock sizes offer a threading range from ¼ to 6 in. in large end diameters; ⅛ to 5-in. pipe. Other sizes may be made up for larger sizes or for special applications.

Dickerman Hitch Feed

A hitch feed which can be adjusted to feed stock to the press with accuracy from less than 1/64 in. to 2 in. on the 2-in. hitch feed and up to 4 in. on the 4-in. hitch feed for each stroke of the punch press has been brought out by H. E. Dickerman Mfg. Company, 2 Wilbraham Rd., Springfield, Mass. The 2-in. hitch feed will handle stock thicknesses of 0.003 to 0.031 in. and up to 0.0625 in. on the narrow sizes. Feed lengths are from 0.000 up to 2 in. on presses having 2-in. or more stroke, and same as the stroke on others. The mounting holes are jig drilled and are interchangeable. Gripper plates are hardened. The main spring is of special wire selected for long wearing quality. Gib screws are provided for wear and

B-K

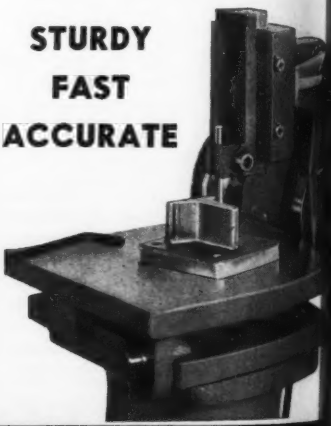
FILING AND HONING MACHINE

(Patented)

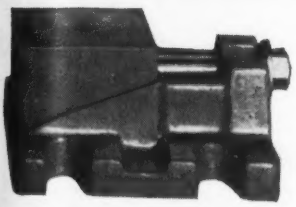
Machine finish your punches. Eliminate the slow, tedious hand method.

Guaranteed to cut your cost. Price and description on request.

STURDY
FAST
ACCURATE



BRICKNER • KROPF MACHINE CO., Inc. MUSKEGON MICHIGAN



Profitable, accurate production demands level machinery. Save tools, time and money. Write for details on precision jacks; three standard sizes.

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New Jersey Office,
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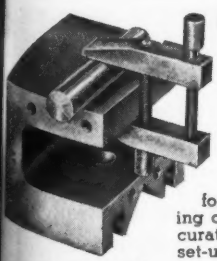
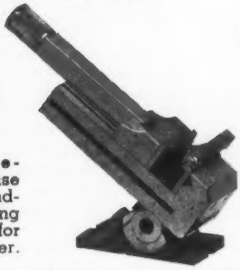


Combination Angle Plate and V-Block

A precision tool that holds cylindrical or flat pieces firmly for drilling, milling or grinding. Accurate . . . saves set-up time.



Combination Vise

A compact, precision tool for use on surface grinders. Jaw opening 0-3½". Send for 10-day trial offer.

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203 LAFAYETTE ST. • NEW YORK

AMERICAN SWISS

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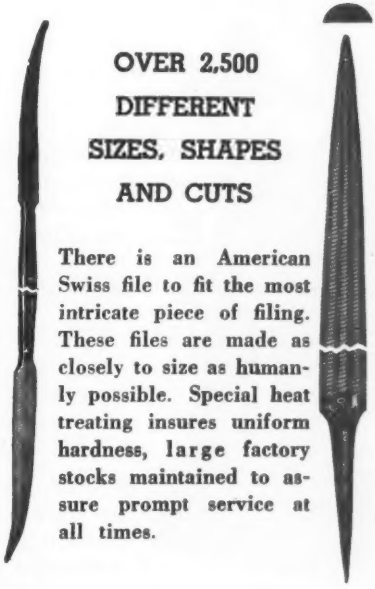
MADE IN AMERICA



OVER 2,500 DIFFERENT SIZES, SHAPES AND CUTS

There is an American Swiss file to fit the most intricate piece of filing. These files are made as closely to size as humanly possible. Special heat treating insures uniform hardness, large factory stocks maintained to assure prompt service at all times.

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ONLY THE BEST

Buy From Your Distributor

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ALWAYS
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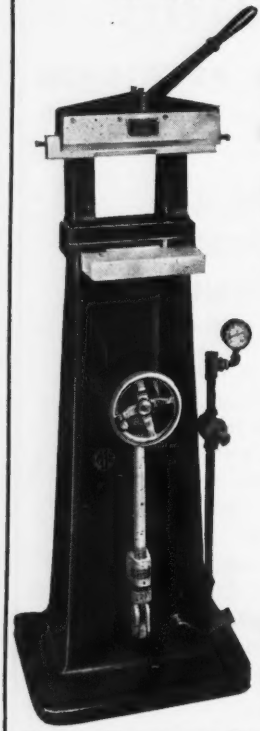

MARKING BY ROLLING IS FAST AND ECONOMICAL. PRESERVES DIE LIFE AND PIECE PARTS. REQUIRES ONLY FRACTION OF APPLIED PRESSURE AS COMPARED TO STAMPING.

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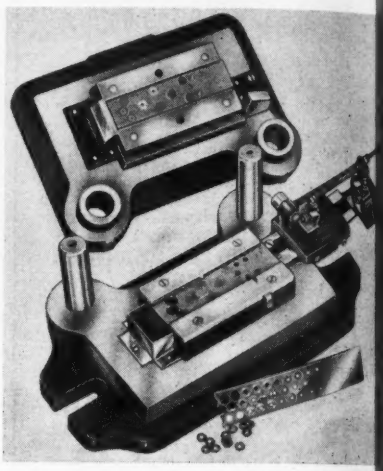
MODEL 25
HI-DUTY
MARKING
MACHINE

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
1806 BELLE PLAINE AVE.
CHICAGO, ILL.

justment. The hitch feed can be mount
ed on the die set or bolster plate of th
press.

The 4-in. hitch feed is of the same
general construction, but will hand



Dickerman Hitch Feed

stock widths from wire up to 8 in. or
the lighter thicknesses. Feed length i
0.000 up to 4 in. on presses having 2 in
or more stroke, and twice the stroke on
less than 2 in. The 2-in. hitch feed
weighs 5 lbs. and the 4-in., 19 lbs. Set
ting up is said to be quick and inex
pensive.

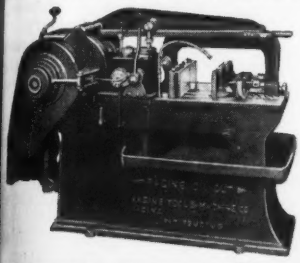
Staples-Type Carboloy-Tipped Reamer

A Carboloy-tipped expansion reamer
which is said to be as rigid and accu
rate as a solid reamer is now being of
fered by Staples Tool & Engineering
Co., Cincinnati, Ohio. The body of the
tool is solid, the end of the reamer being
bored for a tapered expansion plug made
with a taper of 0.020 in. per inch, per
mitting easy adjustment of the tool to
1/10,000 of an inch. A hole drilled
through the shank allows the plug to
be driven out.

The expansion plug contacts the tool
body well beyond the rear of the tips,
assuring uniform outward expansion
throughout the length of the tips. The

RACINE

ETAL CUTTING POWER SAWS



fast accurate power saw, with modern draulic feed and control. For production d all purpose work—6" x 6". Moderately iced.

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ACINE TOOL & MACHINE CO.

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Two Spindles

One spindle is built into the knee beneath the vise table. The other, or top spindle, is mounted in a swinging head. This machine is designed for all types of rapid and accurate milling operations. Simple design — extremely rigid and efficient. Four spindle speeds from 400 to 1700 R.P.M. ½ H.P. motor — V-belt Drives — All ball-bearing equipped. Write for illustrated folder and prices.

Johnson Tool Co., Inc.

East Providence Rhode Island

A BETTER GRIP

for Better Production

The knurled heads on "Unbrako" Socket Cap Screws give the workman a real grip when he's starting to turn the screw into place, and he does start them by hand, you know. Even oily fingers won't slip. He can turn them faster and farther before he uses a wrench. **This saves you time and money.** And—remember, only "Unbrako" has this knurled head feature.

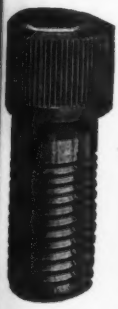

Fig. 1434
Pats. Pend.

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Be sure to specify . . .
KNURLED

UNBRAKO

Socket Head Cap Screws

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA.

BOX 556

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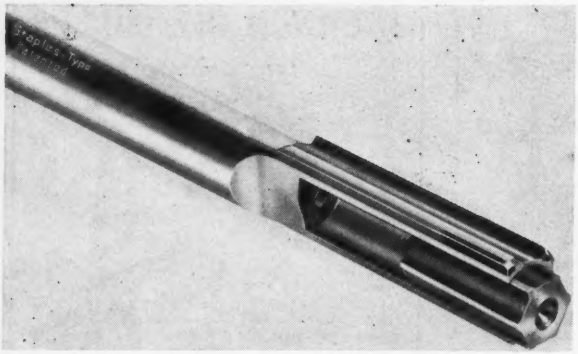

Staples-Type Carboloy-Tipped Reamer

Carboloy tips are copper brazed to the blades in a hydrogen atmosphere furnace, which assures a strong braze of high conductivity. The solid tool body provides rigidity and accuracy comparable to a solid reamer. Flutes are undercut behind the Carboloy tips, thus preventing the blades from scoring the reamed hole. The shank is of nickel alloy steel.

Expansion is obtained without splitting the tool body due to the fact that as the expansion plug is driven in, the body is stressed and the arc is flattened between the lines of contact. As this occurs, the tips are tilted back, increasing the clearance angle. Each expansion of the reamer further tilts the blades, presenting, in effect, new cutting edges. Staples-Type Carboloy-Tipped Reamers are available in all standard and special sizes.

rate of expansion is from 0.004 to 0.020 in., depending on the size of the tool and the number of flutes. Unless otherwise specified, tools are supplied with the expansion plug extending about $\frac{1}{8}$ in. This permits 0.005 in. expansion without removing the expansion plug. Further expansion can be obtained by shimming the tapered hole in the tool body with thin sheet brass.

YE'LL SAVE GOOD MONEY, LADDIE, with this NEW

E-1

AIR DRIVEN GRINDER

½ h.p., 38,000 r.p.m. For Large Dies and Drop Forgings

Fast, smooth grinding is accomplished with the E-1 Grinder because of its exceptional speed and power. Weighing less than 5 lbs. it handles easily, for rough-out or fine finishing. No parts to wear out. Automatic lubrication. Always runs cool. A real craftsman's tool.

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LUMA

Patented

Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly. One of our models popular in tool rooms for 15 years.

Luma Electric Equipment Co.

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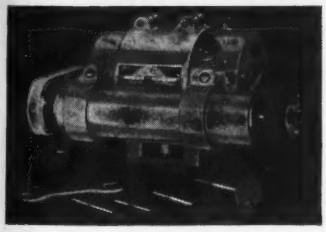
4,200 to 50,000 r.p.m.



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Type J-15 designed for precision bench lathes

All models are supplied with eccentric spindle tube which provides for manual belt adjustments. 1/8 to 1/2 H.P.

Write for details.

The McGONEGAL MFG. CO.

Jones Bldg. East Rutherford, N. J.

LUFKIN UNIVERSAL INDICATOR

You don't need to use a mirror or resort to awkward positions when using the Lufkin Universal Indicator. It has two reading faces so that you can easily take readings direct from the tool, no matter how it is used. The one-piece head is most easily set into position.

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LUFKIN

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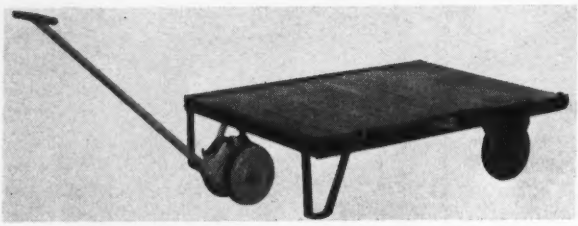
TAPES · RULES · PRECISION TOOLS

Yale & Towne Rollaway Jack System

A Rollaway Jack to be used in conjunction with from one to ten Re-Nu Top Skid Platforms has been designed and placed on the market by The Yale & Towne Mfg. Co., Philadelphia, Pa.



Yale Rollaway Jack with Rollaway Re-Nu Top

The jack is streamlined and mounted on rubber-tired wheels revolving on Hyatt roller bearings which are set on a high carbon steel axle. In order to radically reduce the tendency of hand whip, the jack is provided with a very narrow wheel tread. The handle is of the Yale "Safeti-Sure", balanced type, having an equalizing spring enclosed inside a tube. This spring forces the handle upright when the platform is elevated, thus preventing the handle from falling to the ground.

In addition, the jack is provided with a wide-open prong pocket which is set in front of the hole for guiding the connecting skid platform. The depth of this pocket, plus the position in which the handle is set in the lifting mechanism, keeps the handle at the proper angle for easiest insertion when making connection with the platform. When the handle is pulled down, the load goes up and is automatically locked in position with the handle free. The load can then be pushed with the handle down towards the operator or in a vertical position, or the load may be pulled. To lower, the operator depresses the handle until the weight of the load is felt on his hand, then raises the handle and allows the load to drop to the floor completely under his control.

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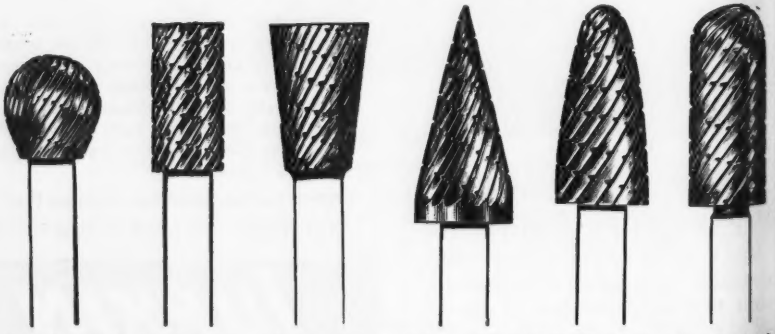
Ground from the Solid



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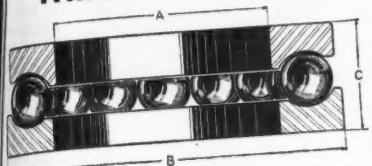
GROBET FILE CORP. OF AMERICA

3 PARK PLACE
NEW YORK CITY

GWILLIAM

THRUST BEARINGS



Type CC—Designed to Take Combined THRUST and LIGHT RADIAL LOADS

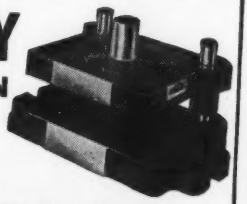
• Especially adapted for slow speed and heavy thrust duty, such as marine rudder posts and similar installations. To order only — any quantity.

OUR CATALOG ON REQUEST.

THE GWILLIAM CO.

358 Furman St., Brooklyn, N. Y.

DANLY PRECISION DIE SETS



Danly All-Steel Sets
Danly Commercial Sets
Danly Die Makers' Supplies

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8 Danly Warehouses Provide 24-Hour Service for 85% of All Metal Fabricating Plants

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COOLANT FLOWS INSTANTLY

"GUSHER" COOLANT PUMPS

Just like your kitchen faucet—"GUSHER" Pumps respond the instant you turn the lever—in a gusher or a trickle.

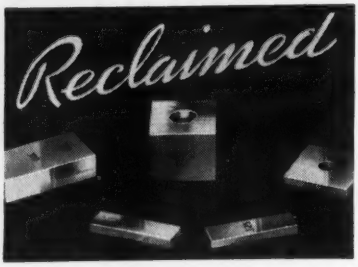
Users take the dependable flow of coolant for granted. That's why you'll see hundreds of machines equipped with "GUSHERS"—they can be put on and forgotten.

Write for complete catalog.

THE RUTHMAN MACHINERY CO.

538 E. FRONT ST. CINCINNATI, OHIO

WORN GAGES



with

Chrome Plate

Retain Their Stability
Have Original Accuracy
Wear Many Times Longer

DEARBORN GAGE COMPANY

"Originators of Chromium Plated Gage Blocks"

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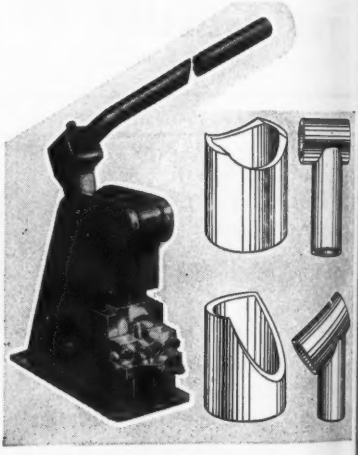
DEARBORN - MICHIGAN

The Rollaway Re-Nu Top Skid Platform is mounted on Hyatt roller bearings and set on axles of high carbon steel to provide easy roll. Welded construction is used, the front prong, cross members, and legs being of one unit, as are the rear wheels and cross members. These two units are built into a sub-frame, thus making a one-piece rigid structure that is welded and bound by lower angles.

According to the manufacturer, the design of the Rollaway Platform permits either one board or the entire deck to be replaced without breaking the weld.

Dreis & Krump "Arc-Fit" Tool

Dreis & Krump Mfg. Co., 7418 S. Loomis Blvd., Chicago, Ill., has introduced a tool, to be known as the "Arc-Fit," which is designed to fabricate pipe and tube ends for welded tee joints,



Dreis & Krump "Arc-Fit" Tool Mounted in Special Hand Press

bevel joints, and double tee connections. In fabricating pipe or tubing, the pipe or tubing is fed endwise over a top shearing lip die contained in the Arc-Fit, during which operation one-half of the radius of the work is sheared out. The work is then rotated 180 deg. and the preceding operation repeated, thus shearing out the remaining half of radius and completing a perfect tee fit ready for welding. A fit of this type

NEW

Shockproof UNIVERSAL INDICATOR

HALF SIZE

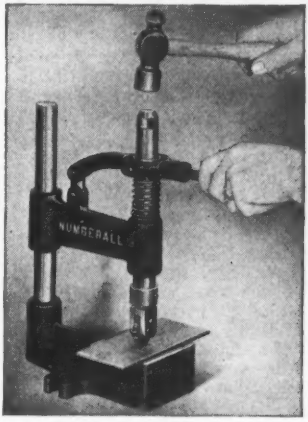
Scale is readable in any position — ideal for jig boring and milling machine operations. Readings can be taken without the use of mirrors when indicator is used upside-down or facing towards back of machine.

If contact point is accidentally pushed beyond total travel of pointer, Indicator will not be damaged. Entire mechanism is shockproof.

The Oslund Indicator has had 12 years of actual shop test. Write for details and prices.

OSLUND TOOL & DIE CO.

1060 BROAD ST. NEWARK, N. J.



MARKING STAND No. 47

For stamping letters and figures on metal —use marking dies, numbering heads, type and holder, etc.

Numberall Stamp & Tool Co.

Huguenot Park, Staten Island, New York

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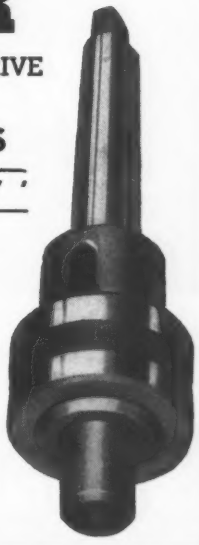
ROLLER ***Floating Holder*** DRIVE

FOR

TAPS • REAMERS • BUTTON DIES

"IT ALWAYS FLOATS"

- **Compensates for machine spindle misalignment, eliminating over-sized or bell-mouthed holes.**
- Floats radially in any position, under load.
- Used on all tapping, reaming, or thread cutting machines.
- Our Engineering Department will recommend the proper holder for your particular job.
- We SPECIALIZE in floating holders and KNOW that our vast experience in this line qualifies us to assist you with YOUR tapping and reaming problems.

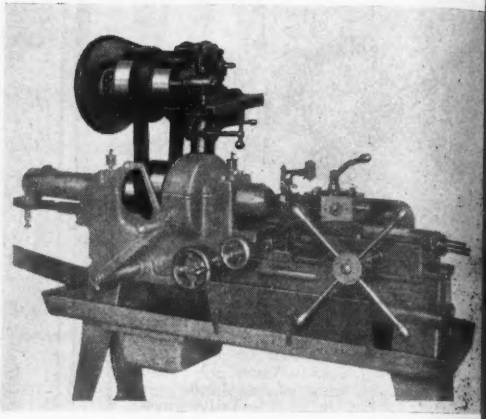


W. M. ZIEGLER TOOL COMPANY

1926 TWELFTH STREET • DETROIT

is said to be produced without distortion to the pipe or tube.

The Arc-Fit is made in three standard sizes to take 1¼, 1½, and 2-in. black pipe or tubing, although other sizes can be furnished on special order. A different size Arc-Fit is used on each different size pipe or tubing. Due to the sub-press design of the Arc-Fit, it can be operated in any punch press having at least a 7-in. die space, and having the necessary tonnage capacity to perform the shearing. Arc-Fits designed for standard pipe up to 2 in. can be used in the special hand press shown in the illustration. The Arc-Fit weighs approximately 17 lbs., and is interchangeable from the hand press to the power punch press without waste of time for die changing. The special hand press weighs approximately 90 lbs., and can be fixed to a truck, column, or shop work bench.



"Modern" Motor Drive

"Modern" Motor Drive

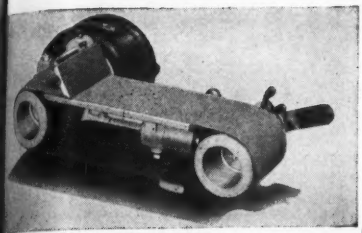
Quality Hardware and Machine Company, 5833 N. Ravenswood Ave., Chicago Ill., is now marketing the motor drive illustrated herewith. The drive is ap

Modern Counters For Modern Machines

NEW Series H Productimeters, clean-lined in their wrinkle finish, dust-proof cases, combine modern design with all the features tried and proved over sixty years of building counters for industry. Stroke and Rotary models in 20 variations.

DURANT MFG. CO.

1932 N. Buffum St., Milwaukee, Wis. • 173 Eddy Street, Providence, R. I.



NEW An Inexpensive ABRASIVE BAND GRINDER..

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER
WALLS SALES CORP.
96 WARREN ST. NEW YORK, N. Y.

Precision Tool Room Tapping SAVES TIME - TAPS - TROUBLE

Eliminate wasting of valuable time by highly paid skilled men, attempting to tap hole accurately by hand.

Capacity to 7/8"

The Master Tapper Co.
4 Main St. • Belleville, N. J.

10 Months Of TOP PERFORM-ANCE

Is the Record of

MARTIN MASTER COLLETS

• Modern Collet pioneered the development of the master collet with quickly-interchangeable pads. Since the Martin Master Collet was introduced ten months ago, it has been subjected to every possible production test in hundreds of plants throughout the country. The results, in every case, have clearly proven every claim for time-saving . . . for absolute assurance that the pads will not become loose . . . for extreme economy in use.

if you're looking for a master collet which will permit a complete collet size change-over in from five to seven minutes—and one which will provide the maximum in trouble-free service—you can be sure of getting what you want. Specify the master collet which was the first of its type to be introduced, and, by reason of its exclusive features, continues to be first in efficient and economical performance.

Complete information on the Martin Master Collet is yours for the asking. WRITE TODAY.

MODERN COLLET AND MACHINE CO.
401 Salliotte St. Ecorse, Mich.

plicable to any belt-driven machine, and is especially suited for converting line shaft drives on cone-pulley machines to individual motor drives.

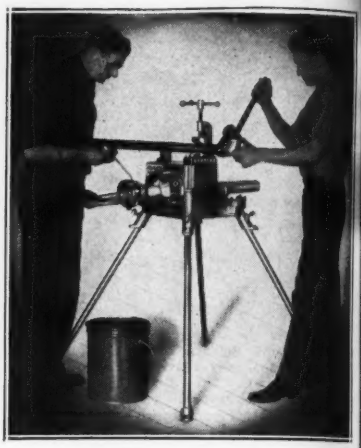
The drive is a self-contained unit, including motor mounting, and is easily attached by means of four bolts. Power is transmitted from the motor to the countershaft by V-belt, a standard flat belt being used on the cone pulleys. Both vertical and horizontal adjustments are provided so that the belts can be kept at the proper tension. The control is hand-operated, although the units can be equipped for electrical controllers.

In addition to the column mounting for use on lathes, shapers, and similar machine tools, a series of mountings is also available for presses, power saws, and similar types of equipment.

Beaver Model C Portable Pipe and Bolt Machine

A portable pipe and bolt machine with an electric motor built in has been developed by Beaver Pipe Tools, 1001 Dana Ave., Warren, Ohio. In this machine a threading unit is combined with a pipe vise and bending device, making it possible for two men to work at the same time—one threading and the other bending or making up fittings.

A conventional type geared chuck is employed with which pipe from ⅛



Beaver Model C Portable Pipe and Bolt Machine

2 in. and bolts from ¼ in. up can be gripped. Pipe up to and including 2-in

Small Tools...

Long Length Drills
Special Size Taps
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High speed and carbon drills, taps, reamers, milling cutters, hollow mills, end mills, drill rod, die sets, etc. . . .

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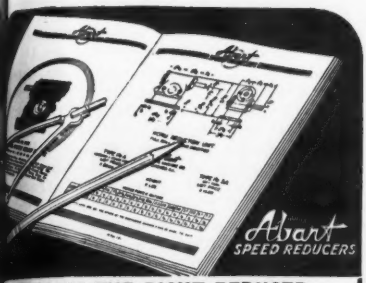
VICTOR MACHINERY EXCHANGE
(INCORPORATED)
251 CENTER ST. NEW YORK CITY



SELECT THE RIGHT REDUCER FROM THIS BOOK!

This new Abart Speed Reducer Catalog will give you the correct answer to your speed reducer problem quickly. In it you'll find information on ratings and other essential data that will help you select the most efficient type and style Abart unit for your job. Write for your catalog today.

GEARS: Quality gears made to meet most any requirement. No stocks. Made to B/P or specifications only. Let us estimate.

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MANUFACTURERS OF
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4819 WEST 16TH ST. CHICAGO ILLINOIS

THE DIAMONDS IN THIS WHEEL DRESSER CAN'T COME LOOSE!

DIAMONDS HELD PERMANENTLY IN SPECIAL MATRIX

The diamonds in Carboloy Dressers can't come loose. They are actually "wetted" to a special matrix and permanently held in place. With Carboloy Dressers you eliminate all remounting expense —and save at least 25% on dresser costs on all rough, semi-finish and finish dressing jobs. Send for Catalog DR-38.

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Chicago • Cleveland • Newark
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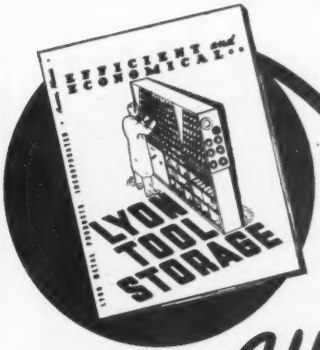
Catalog DR-38

• CARBOLOY •
DIAMOND IMPREGNATED WHEEL DRESSERS



ANSWERS All TOOL STORAGE PROBLEMS

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The New Boyar-Schultz

HEAVY DUTY

PROFILE GRINDER No. 2

A New HIGHSPEED PROFILE GRINDER built to perform successfully on Tool and Die work of larger and more difficult types.

It is designed to do rapid and exacting work on profiles, contours and uneven surfaces that under ordinary methods consume many costly hours.

The Boyar-Schultz Heavy Duty Profile Grinder No. 2 is a PRECISION MACHINE TOOL in every respect and is smooth running. All controls and adjustments are operated conveniently from the front. Its HIGHSPEED is accomplished by a 2 H.P., G.E. Ball Bearing mounted Motor, the spindle turns at approximately 10,000 R.P.M. with vertical oscillations of 100 per minute. It is a rapid stock remover, even with small diameter wheels.

Boyar-Schultz Portable Profile Grinder No. 1 is saving time in grinding, and fitting irregular shapes, contours and profiles for many Tool and Die Shops and Special Machine Shops throughout this country and abroad. It is light in weight and portable. Running at approximately 20,000 R.P.M. it gives a smoother finish in a much shorter time.

Write For Circulars Describing These Machine Tools

BOYAR-SCHULTZ CORPORATION

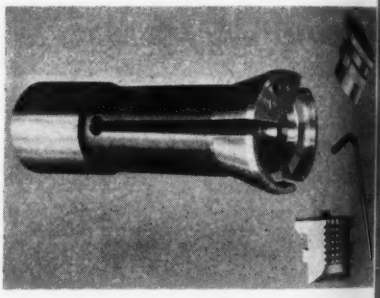
2120 Walnut Street • Chicago, Illinois

size is threaded with solid full width dies at a speed of approximately 2 r.p.m. Bolts are threaded up to 1½ in. Geared tools can be operated to thread pipe up to 8-in. diameter with enough power to start and stop at the point of heaviest cutting without undue strain.

The machine is powered by a Black & Decker ½ h.p. universal motor, either 110 or 220 volt. Power loss is reduced to a minimum through the use of five ball bearings and two roller bearings in the gear reduction. The main drive gear runs in a bath of oil. The machine is designed for either bench or stand use. For bench use, complete with chuck wrench, the unit weighs 140 lbs. net.

National Acme "QC" Master Collet

The National Acme Co., Cleveland, Ohio, has placed on the market a master collet equipped with a quick change pad which is designed to take stock sizes up to maximum spindle capacities of all

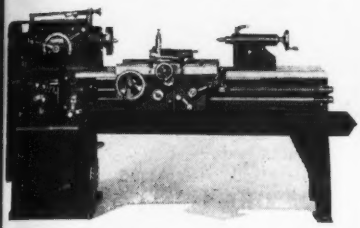


National Acme "QC" Master Collet

Acme-Gridley Multiple Spindle Automatic Bar Machines using draw-in type collets. The master collet, to be known as the "QC," and the pad are made from selected steel that has been machined with tool room precision, heat-treated, hardened, and tested for strength and uniformity.

In the "QC" Master Collet, the screw that holds the pad is located in the face of the pad; thus the operator has only to loosen the screw with a small hex socket wrench and the pad can be quickly lifted out. No removal of collet or holding of its tube at the rear end of the machine is necessary. The simple and quick change of the pad reduces to a minimum the time the machine must

New
"C & J"
15" and 16" Lathes



12 Speed Geared Head-Motor Drive
Timken mounted spindle
Modern Design—Liberal Dimensions
Write for bulletin.

The Carroll Jamieson Machine Tool Co.
BATAVIA • OHIO, U. S. A.

Why Use A Shaper
to cut Keyways when a
DAVIS KEYSEATER
will do the job so much quicker and better?

Send for Circular

DAVIS KEYSEATER CO.
Exchange and Glasgow Sts.
ROCHESTER, N. Y.

How One Manufacturer SAVED $50 A DAY

...ow another increased machine production 10% to 20%! Etc! Etc!

...re's how to STOP choking ...o automatic high speed ma...ines with slow manual feed...g and receiving.

...mazing economies are being effected ...y plants using the new materials hand...g method provided by the new Rotary ...abelator. Write for Bulletin giving their ...periences in reducing costs, saving ...me, conserving space and reducing em...loyee fatigue. This Bulletin will also help ...u check your plant for applications.

NEW Rotary TABELATOR

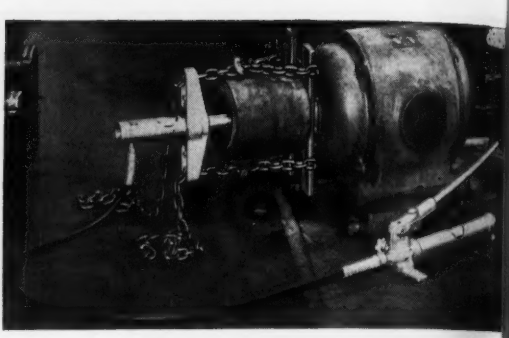
A Product of

ROTARY LIFT CO.
Specialists in Oildraulic Elevating Devices
...01 KANSAS STREET MEMPHIS, TENN.

remain non-productive for pad size changes or replacements.

When the pad screw is tightened, the dove-tailed shoulder on the pad tongue is drawn downward into a groove in the collet. The dove-tailed design positively seats each pad and, with firmly locked down engagement, maintains a bearing along the full radius of its collet section. This arrangement is said not only to resist shock of feeding, but also to prevent loosening and breakage of screws and misalignment of pads when the machine is being loaded.

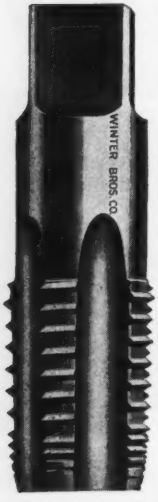
The "QC" Master Collet is supplied in all sizes for National Acme Multiple Spindle Automatic Bar Machines Models RA, R, GA, G, C, and for Bar Machines Model B, in sizes of 2, 2¼, 3, and 3⅝ inches.



Porto-Power Unit in use for pulling drive pulley off shaft of electric motor.

"Porto-Power" Unit

A self-contained portable hydraulic unit weighing 26 lbs. and capable of developing 10 tons of power, labeled the "Porto-Power" Unit, has been developed by Blackhawk Manufacturing Co., Milwaukee, Wis. The unit consists of a pump, hose, and ram. Operation of the pump forces oil through the 6-ft. high pressure flexible hose to the ram, developing power for performing a wide variety of operations such as pulling gears or pulleys off shafts, bending or straightening pipe, raising heavy loads where a crane is not available, inserting or



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WINTER TAPS

Will cut them quickly and accurately

—and at economical cost!

WINTER BROTHERS COMPANY

Main Factory: WRENTHAM, MASS.

Branch Factory: DETROIT, MICH.

A Division of

THE NATIONAL TWIST DRILL & TOOL CO.

DETROIT, MICHIGAN

NEAT STAMPING in NAME PLATES

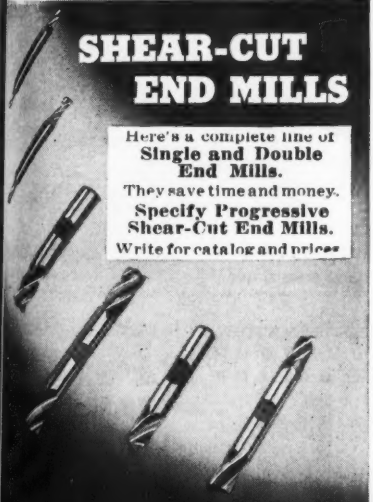
This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc.

1806 Belle Plaine Ave. Chicago, Ill.

SHEAR-CUT END MILLS



Here's a complete line of **Single and Double End Mills.**

They save time and money.

Specify Progressive Shear-Cut End Mills.

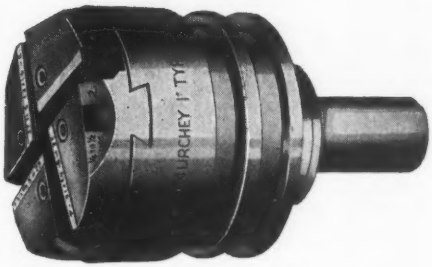
Write for catalog and prices

PROGRESSIVE TOOL & CUTTER CO.

2345 WOLCOTT ST. • FERNDALE, MICH.

Murchey

Tangent Chaser Self-Opening DIE HEADS



TYPE "T-C"

(Also furnished in non-rotating type)

Designed to use Tangential Chasers, these heads will cut extremely accurate threads on long production runs. Positive opening and accurate closing is accomplished by four rugged cam prongs.

Made of special alloy steel, hardened and ground throughout.

Write for bulletin.

MURCHEY MACHINE & TOOL CO.

DETROIT • MICHIGAN

Murchey also manufactures all styles of Self-Opening Die Heads, Collapsible Taps, Bolt and Pipe Threading Machines, Pipe Cutting-Off Machines, Double End Reaming, Chamfering, Drilling and Threading Machines.

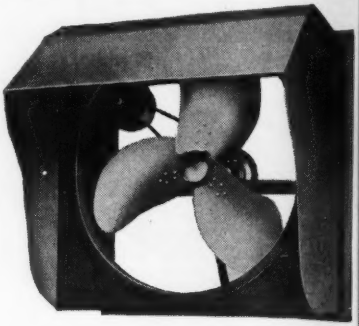
removing bushings, and so on.

The Porto-Power Unit can easily be carried to the job and operates horizontal with the floor or in any other desired position. The remote control feature makes the Porto-Power Unit valuable as a jack for use in dangerous or cramped quarters. In addition to the unit itself, special attachments and tools are available for bending, spreading, pulling, pushing, and so on.

Chelsea Apartment Model Cooling Fan

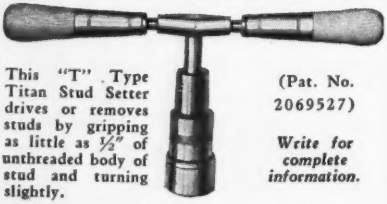
The apartment model cooling fan shown herewith, product of Chelsea Fan & Blower Co., Inc., 370 West 15th St., New York, N. Y., can be installed in connection with the upper part of a window to supply a draft of cool air where needed. The fan is manufactured in two sizes; 24 and 30 in. It is sturdily constructed of steel, but proportionately light in weight. The motor is a special fan duty type with high efficiency. The fan rotates at a slow rate of speed but has a specially constructed blade to deliver a large volume of air without noise. Protection from weather is afforded by a metal awning. The fan is finished in durable weatherproof paint.

The blades are assembled and tested by precision methods which are said to result in perfect balance and absence of vibration. The motor has low power consumption and a special starting winding which cuts down inrush of current and starts the fan slowly. A Chelsea rubber-mounted belt tension device is standard equipment, together with thermal overload electric protection.



Chelsea Apartment Model Cooling Fan

SET STUDS "The Roll Grip Way"



This "T" Type Titan Stud Setter drives or removes studs by gripping as little as ½" of unthreaded body of stud and turning slightly.

(Pat. No. 2069527)

Write for complete information.

Titan Tool Co., Fairview, Pa.

CENTERLESS GRINDING

STRAIGHT · CYLINDRICAL
SHOULDER—PROFILE
AND DOUBLE DIAMETERS

All Kinds of Materials

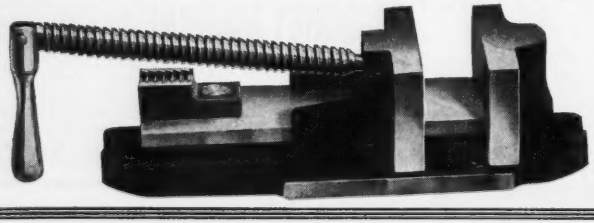
SCREW MACHINE PRODUCTS, HEAT-TREATED AND GROUND, IF NECESSARY

Send Blueprints or Samples for Estimates

PORTER MACHINE COMPANY
3120 FORRER AVE. CINCINNATI, OHIO

SAVE OPERATING TIME ON YOUR DRILL PRESS BY USING THE GREENE

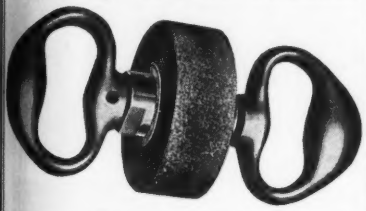
SPEED VISE



Instantly adjustable to any position. Locks and unlocks with a half turn. Positive grip. Ideal for making into a special jig. Write for bulletin 21-P.

CARDINAL MACHINE CO.
109 S. Jackson St.
Glendale • California

The Desmond
CRACKERJACK
Grinding Wheel Dresser



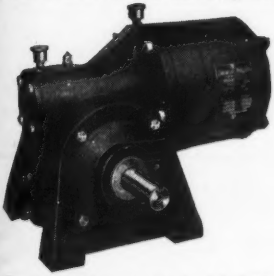
The 4" dia. wheel is mounted on dust protected ball bearings with safety type handles.

It will quickly dress a square edge or bevel on your grinding wheel.

The Desmond-Stephan Mfg. Co.
URBANA, OHIO

Canadian D.-S. Co., Hamilton, Ontario

Janette
Motorized
SPEED REDUCERS
Sizes from 1/50 to 7½ H.P.



We offer 10 different styles in 37 sizes from which to choose the exact reducer to meet your individual requirements.

Bulletins and recommendations on request.

ALSO ROTARY CONVERTERS—
BLOWER WHEELS—MOTOR GENERATORS

Janette Manufacturing Company
556-558 West Monroe Street
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NEW
DEVELOPMENT

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EVANS REAMERS

SURPASS ALL.
HIGH SPEED STEEL.

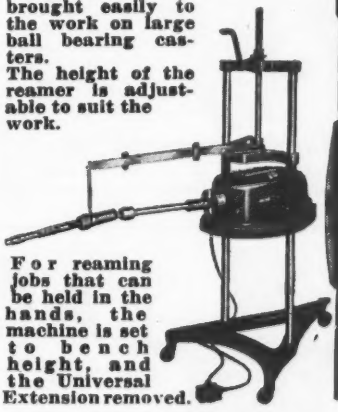
No Honing.
Chrome Like Finish.

50 to 80 thousandths expansion.
Full Bearing Surface.
Perfect Alignment.
Will not chatter.
With Left and Right Spirals. It cannot fall in slots or oil grooves. Extension Pilots for Line-up Work.

UNIVERSAL REAMER DRIVE

FOR REAMING HEAVY JOBS ANYWHERE IN THE SHOP

The machine is brought easily to the work on large ball bearing casters.
The height of the reamer is adjustable to suit the work.



For reaming jobs that can be held in the hands, the machine is set to bench height, and the Universal Extension removed.

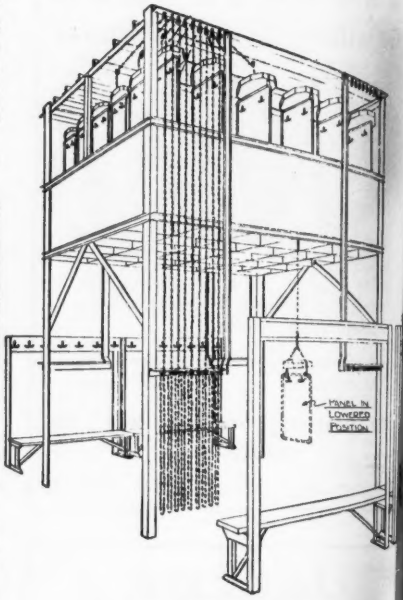
WRITE FOR CIRCULAR

Evans Flexible Reamer Corp.
4541 RAVENSWOOD AVE., CHICAGO, ILL.

Lyon Overhead Lockers

The problem of providing storage for the factory employees' street clothes while the men are at work has been solved by the development of a Lyon Overhead Locker. This locker, made by Lyon Metal Products, Incorporated, 1302 River St., Aurora, Ill., is designed so that the workman can stand on the main floor and hang his clothes in a panel which can be pulled up into an overhead locker and thus kept out of the way.

The locker system consists of a super structure of steel which supports locker cubicles. Combination clothes pans and panels are suspended from the top of the super structure by chains and pulleys in such way that the panels can be raised and lowered when desired. The chains can also be padlocked to the super structure if necessary. Each locker unit consists of a pan 2½ in. deep to hold the hat, personal belongings, and so on, and from this pan is supported a clothes panel with hooks on either side for clothing. Each individ-



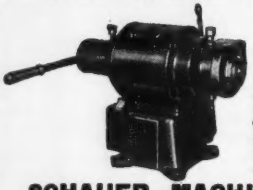
Lyon Overhead Lockers

For Machine and Tool Work and Quick Set-Ups

use Reich's, the only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. Price $5.00 Write for folder.

J. R. REICH MFG. CO.
334 Triangle Ave. Dayton, Ohio

IDEAL SPEED LATHES



FOR LAPPING
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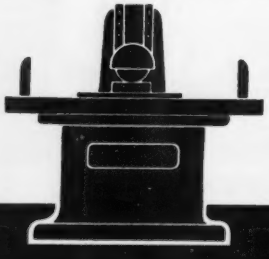
SMALL PARTS

2 Speed Motor. Automatic Brake Collet or 3 Jaw Chucks. Hand operated or automatic. Write for Circular 380.

SCHAUER MACHINE CO.
2060 READING ROAD • CINCINNATI, OHIO



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ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE, R. I.

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IDEAL marking tools prevent loss through theft, and mistakes in assembly — identify parts — mark sizes or uses on tools, etc.

IDEAL ELECTRIC MARKER

Inexpensive

Marks all metals, tile, glass, plastics, etc. Works like an electric hammer—7200 strokes per minute. Special diamond point available for marking hard materials.

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—IN THE SMALL RANGE—Spurs, Spirals, Bevels, Worm Gearing, Racks, Ratchets, etc.

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Compare Butterfield Taps with other taps for accurate threads and long life. The difference will reveal the superiority of Butterfield Taps and their profit possibilities.
You get more "thread mileage" per tap.

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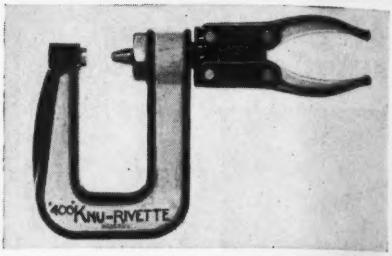
UNION TWIST DRILL COMPANY
BUTTERFIELD DIVISION
DERBY LINE • VERMONT
Factories: DERBY LINE, VERMONT • ATHOL, MASS.
ROCK ISLAND, QUEBEC • MANSFIELD, MASS.

ual locker unit may be occupied by either one or two persons.

The sturdy bench and clothes rack are built as one assembly. Each bench seat is of heavy yellow pine, sanded and shellacked. The super structure is bolted together and braced to assure absolute rigidity, although the installation may be dismantled and moved if desired. Single-faced units consist of three rows of six or a total of 18 lockers. Double-faced units consist of six rows of six or a total of 36 lockers. All steel parts are finished in baked-on green enamel.

"Knu-Rivette" Toggle Unit

A toggle unit comprised of a combination of levers working in conjunction with a plunger to generate sufficient power to pierce ⅜-in. diameter holes in 0.050 sheet steel, or cold head ⅛-in. diameter aluminum aircraft rivets, has been placed on the market by Knu-Vise Products Co., Inc., 6432 Cass Ave., Detroit, Mich., under the trade name of "Knu-Rivette." The yoke of the unit is detachable, allowing for the substitution of larger or smaller sizes, while the relative distance between the punch and die is adjusted by merely unscrewing the toggle unit, and then locking it in place with a jam nut. The plunger is tapped ¼ in., and a punch, riveting member, or ferrule is added to suit individual requirements. The die button or riveting anvil for use on the yoke is held in position by means of a set screw.



"Knu-Rivette" Toggle Unit

Williams Torque "Measurrench"

J. H. Williams & Co., 225 Lafayette St., New York, N. Y., have announced the No. S-57 Torque "Measurrench" of the reversible ratchet type. This wrench

SHELDON Back Geared Screw Cutting PRECISION LATHES

Why Buy Used Equipment . . .

. . . when you can buy NEW, full weight, full sized SHELDON Precision Screw Cutting Lathes, at such low prices . . . can get exactly the lathe you want with just the features, attachments and accessories you need.

10", 11" and 12" Precision Lathes with a full line of accessories and attachments.

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No. 1020 BMW (as illustrated) $185 F.O.B. Factory

Dealers: Some territories still open.

SHELDON MACHINE CO., Inc.
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Hardened and ground spindle with Oversize Bronze Bearings • Worm Feed Apron with Power Cross Feed • Semi-Quick Change Gear Box—¾" Collet Capacity • Hand Scraped Ways—2" "V"-ways, 2 Flat Ways • Overhead Motor Drive Attachment (Motor Extra).

ROTARY SURFACE GRINDERS by WALKER

Capacity 12" Dia.

Provides for ample power, rigidity and accuracy for high production work. Quick adjustments on a wide range of work. Write for complete catalog.

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GRANT RIVETERS

• Pioneers in the riveting field. Head rivets from smallest to ¾" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles.

Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport, Conn.

Investigate this FASTER PRESS *Made by* ELMES

THIS Elmes hydraulic forming and drawing press is one of the fastest hydraulic presses in existence. It includes many engineering advancements; for example: (1) New, accurate automatic, controls; (2) Any desired pressure up to maximum is obtainable by a quick adjustment; (3) Moving parts pressure lubricated; (4) Especially convenient for setting dies; (5) Designed for precision in output. Numerous other features. Ask for complete specifications.

CHARLES F. **ELMES** ENGINEERING WORKS
216 N. MORGAN ST. *Chicago* SINCE 1851

which indicates right hand torque, combines mechanical features which make it a most efficient and durable tool at a moderate price.

The wrench may be used in two ways as follows: 1. By Sight Reading—The calibrated scale shows applied pressures of 20 to 200 foot-pounds. It is read at the point where the index shoulder crosses the scale. 2. By Sound Reading—A sharp sound signal is given for any desired torque from 35 to 200 foot-pounds, by setting the simple sound device.

Accuracy does not depend on delicate gears, levers, or dials, but upon rugged sections of high tensile steel. Although right hand torque only is measured, the wrench action reverses for left hand turning.

Simple in design and sturdy in construction, the reversible ratchet mechanism is highly desirable feature. The 36-tooth ratchet wheel with patented

Williams Torque "Measurrench"

double-tooth pawl, makes possible the unsually short operating swing of only one-thirtieth (1/30) of the full turn; obstruction hazards are reduced to the minimum. The wrench action is instantly reversed by a flip of the shifter, which is flush with the head.

The well balanced drop-forged handle, with specially designed grip, is 19½ in. long for ample leverage; the head is exceptionally compact and free from protrusions, for easy use in close and hard-to-get-at places. Every part is made of alloy and high tensile steel, accurately machined and scientifically heat treated. Finished in chrome plate with entire top and sides of head and

ROTARY TABLE

High Grade. Low Price.

Now made in four sizes and six models. Plain rotary milling tables and combination tables with dividing plates. *Ask your dealer or write us for complete catalog.*

ALFRED A. TROYKE

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CENTERLESS GRINDING

Accuracy—Prompt Service

Commercial Centerless Grinding Co.

6538 Carnegie Ave., Cleveland

STAMP...STAMP...STAMP - THE "THORS" ARE MARKING

THOR Stamps give clear, uniform marks—for a long time. More marks per dollar.

Made of special, correctly-heated alloy steel. Central striking point gives uniform indentation. Thumb side marking makes them easily read—easily used. Write for catalog.

The Pittsburgh Stamp Co., 812 Canal St., Pittsburgh, Pa.

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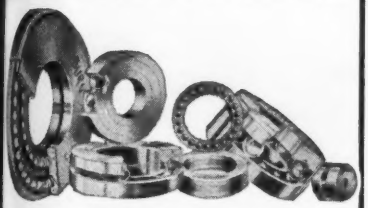

MADE TO ORDER

Auburn Special Ball Bearings are made to customer's dimensions or to answer specified service conditions. Send details of your problem and get the Auburn Answer.

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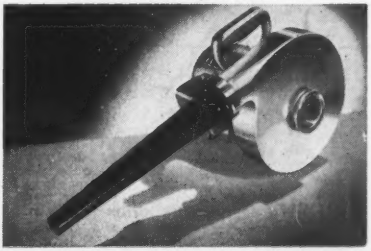

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CLEMENTS Mfg. Co.
6655 S. NARRAGANSETT AVE. CHICAGO, ILL.

SET THESE PACKS OF LENOX WOLVES ON THE TRAIL OF METAL CUTTING JOBS!

"HIGH-SPEED" • "MO-SPEED"
"TUNGSTEN" • "SUPER-FLEX"

Cut for cut, blade for blade, "LENOX" quality and uniformity more than hold their own. If you are looking for long lasting keen edge blades insist on LENOX.

Sold by distributors everywhere

American Saw & Mfg. Co.
Springfield, Mass.

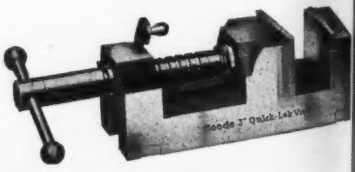
• LENOX *"The Blade in the Plaid Box"* LENOX •

calibrated bar buffed; the handle is "satin" chrome.

The Williams Torque "Measurrench" No. S-57 is designed especially for use with Williams Standard "Supersockets," but can be applied to any detachable socket having ½ in. square drive-opening.

Goode 3-In. Quick-Lok Vise

The illustration shows the 3-In. Quick-Lok Vise for use in production departments on drilling, tapping and milling operations, and in tool rooms for use on jig boring, drilling, and surface grinding machines, which has been developed by the Goode Engineering Co., 196 Par St., New Canaan, Conn. The outstand



Goode 3-In. Quick-Lok Vise

ing feature of the vise is the adjustabl moving jaw which is actuated by means of an alloy steel shaft with a shell having concentric grooves to receive a latch attached to the body of the vise. A telescoped Acme thread screw on the end of the shaft permits the jaw to be quickly tightened against the work.

The body and jaws of the Quick-Lok Vise are made of semi-steel castings with the jaws hardened. One jaw is provided with a vee groove for centering round work. The bottom and sides of the vise are ground square with the jaws, while the tail end is machined square with the sides. The vise, in addition to its general tool room efficiency can be quickly adapted for use as a production jig or fixture by simply removing the standard set of jaws and replacing it with a special set for holding odd shaped parts.

Binrack Assembly Units

The Gordon L. Hall Company, Old Lyme, Conn., has augmented its line of Binracks by the addition of the 2, 3 and 6-in. standard bins and the 4 and

STRAIGHT-CIRCULAR-IRREGULAR CUTTING OF SHEET METAL

BEVERLY cuts flat to any size or shape. Three sizes: No. 1, weighs 16½ lbs.; cuts up to 14 gauge. No. 2, weighs 32 lbs., cuts up to 10 gauge. No. 3 weighs 55 lbs., cuts up to 3/16 gauge. Write for circulars and prices.

BEVERLY
Throatless Shear Co.
3004 W. 111th St.
Chicago Illinois

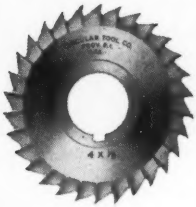
GEARS
Good Gears Only
All Kinds
Any Quantity
AT THE RIGHT PRICE
THE CINCINNATI GEAR CO.
1825 Reading Road Cincinnati, Ohio

Wire-Working Machinery
Wire Mill Equipment
Sleeper & Hartley, Inc.
Designers and Builders
Worcester, Massachusetts

Specify CIRCLE "R" Saws

R

TRADE-MARK



CIRCLE "R" Saws are made in both high speed and carbon steel, from 1/4" to 10" diameter. Prompt delivery on all standard or special saws. Write for catalog.

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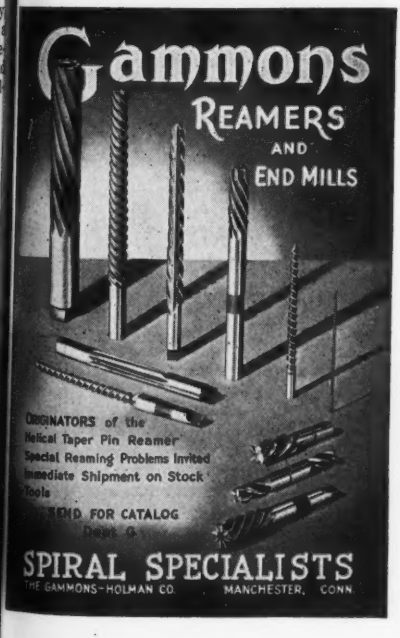

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HY-TEN "M" TEMPER ALLOY STEEL

- .70 Carbon Cr-Ni-Moly Oil Hardening.

Rounds, Squares, Flats for Immediate Shipment.

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MICROMETER OFFSET BORING HEAD HAS RIGIDITY *PLUS* A Large Range 2" OFFSET

¾" bar or tool capacity.
Bores ½" to 12" dia. holes.
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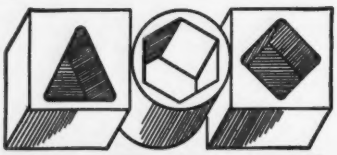

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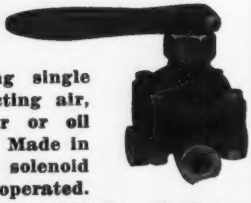

For operating single or double acting air, steam, water or oil cylinders. Made in lever, foot, solenoid and motor operated. All pressure up to 3000 lbs. Bulletins on request.

Other Products: Arbor Presses, Flexible Couplings, Steel and Stainless Ball Floats, Steam Traps and Separators, Air Separators, Traps and Vents, Etc.

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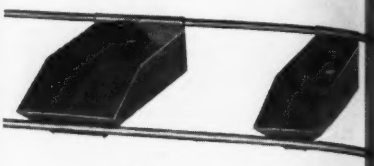
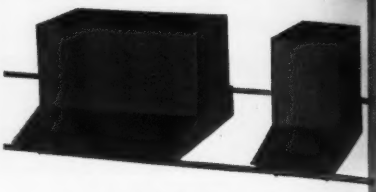
136 Oregon St., Wilkes-Barre, Penna.

8-in. hopper bins shown in the illustr
tions herewith. The standard bins a
of the same design as the previous bi
excepting for size. Each bin is form
of a single piece of metal and is curv



2 and 3-In. Standard Binracks

at the back to form a hook by which
is anchored to the rod which serves
a support. The sloping position of t
bins in the rack aids in keeping t
material at the front of the bins. A



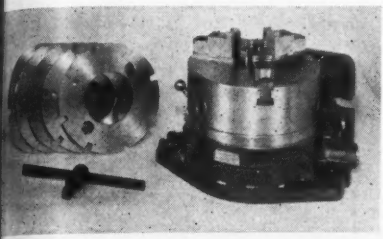
4 and 8-In. Hopper Bins

standard bins are identical in depth an
front-to-back dimensions.

Hopper type bins are made in 4 an
8-in. widths only and are intended fo
use for increased parts capacity in th
top tiers of the racks.

Ever-Tru Abrasive Wheel with Metallic Center

An abrasive wheel with a metallic ce
ter containing an insert of elastic wove
wire mesh, designed to ensure the mai
tenance of trueness throughout the li
of the wheel, has been developed b
Ever-Tru Abrasive Wheels, Inc., 1
Hudson St., New York, N. Y. The wir
mesh is positioned between the abrasiv
rim and the metallic center, impartin
to the wheel the following advantage
(1) Automatic centering and balancin
(2) Decrease in pressure required, d
creasing the normal fatigue of the ope
ator. (3) Decrease in amount of hea
imparted to work by the wheel. (4
Equally balanced and co-ordinated grin
ing. (5) Increased length of life due



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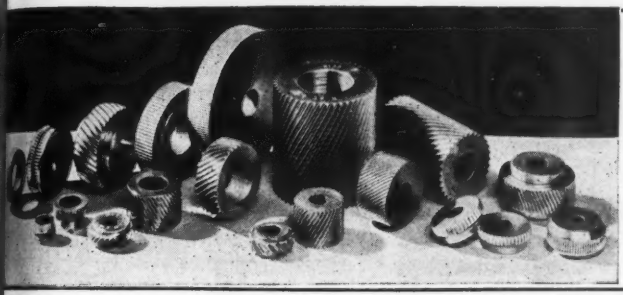
Adaptable for milling, drilling, slotting or planing. For rapid indexing, simply release clamp, withdraw index plunger, revolve turret.

Standard equipment — six mask plates, self-centering chuck, sliding handle wrench. Write for folder.

HARTFORD SPECIAL MACH'Y CO.
HARTFORD • CONNECTICUT



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SPECIAL KNURLS

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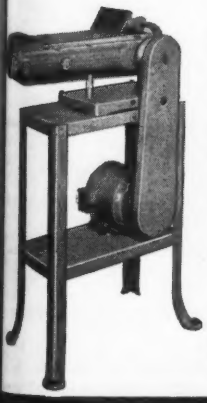
New

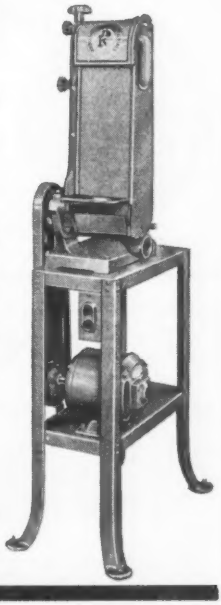
ABRASIVE BELT SURFACER No. 608

Adjustable from horizontal to vertical position in a few seconds.



Here's a new, handy, compact polishing machine with a large capacity for production work. The work or belt table is 15" long x 6" wide with a surface speed of 2300 ft. per minute. Exhaust connection provided and vacuum cleaner bag may be attached —no dust—no dirt. Write for folder.

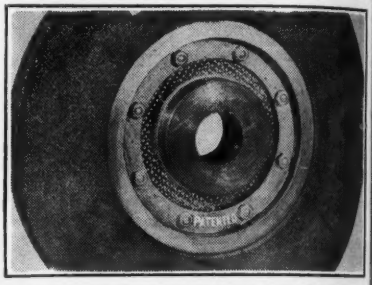
Other Sizes and Types.



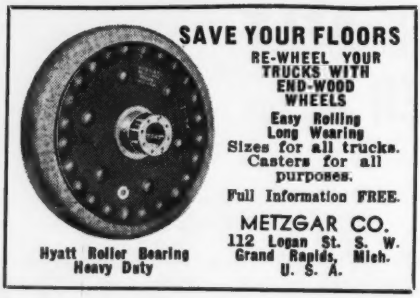
PRODUCTION MACHINE COMPANY
GREENFIELD • MASSACHUSETTS

fact that abrasive can be used down to the metallic center. (6) "Ever-Tru" Centers may be used over and over again with the abrasive simply and quickly replaced. (7) Less power required. (8) Less vibration and wear of bearings on grinding machines. (9) Elimination of re-testing of wheels for balance. Balance is automatic and permanent. (10) Maximum authorized speeds may be used with safety.

Ever-Tru Grinding Wheels are claimed by the manufacturer to be unique in that they provide constant contact between the wheel and the work, due to the permanent, automatic self-balancing attained by the centrifugal action of the Ever-Tru Center with its elastic wire mesh insert. Vitrified Ever-Tru Grinding Wheels are said to provide at high speeds the advantages of a vitrified bond with the elasticity of Bakelite and similar resinoid bonds.



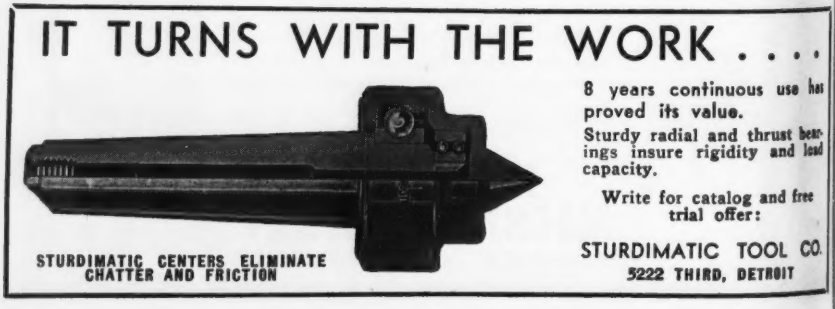
Ever-Tru Abrasive Wheel with Metallic Center



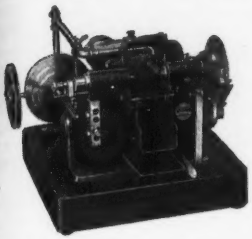
Roller Leaf Spring-Actuated Micro Switch

Micro Switch Corp., Freeport, Ill., has introduced a roller leaf spring-actuated switch which is designed for service in applications where small moving power is available to make or break circuits, in applications requiring low friction and minimum change of operating point through wear, and in applications where roller action is required between the cam and switch lever. The switch can be used to control motors, heaters, solenoids, and so on, from cams, slides, or rolls.

The leaf spring is stainless steel ribbed and the $\frac{3}{16}$-in. wide roller is case hardened and mounted on an oilless bronze


IT TURNS WITH THE WORK . . . .
8 years continuous use has proved its value.
Sturdy radial and thrust bearings insure rigidity and load capacity.
Write for catalog and free trial offer:
STURDIMATIC TOOL CO.
5222 THIRD, DETROIT
STURDIMATIC CENTERS ELIMINATE CHATTER AND FRICTION

"Waltham" Pinion Cutting Machines



Are made with a variety of equipments. They will make the two or three successive cuts needed for watch pinions or may be used for fine pitch gears up to 1½" diameter. There is also a 4" size. If you will describe your work we will send details.

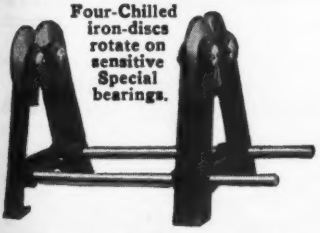
Waltham Machine Works
WALTHAM • MASS.

Improved Anderson **Balancing Ways** *No Leveling Required*

A simple and excellent device for balancing, straightening and trueing.

They are made in the following sizes:

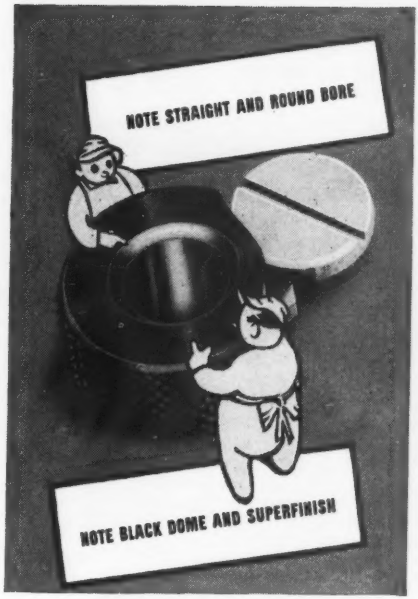
Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Four-Chilled iron-discs rotate on sensitive Special bearings.

Write for Full Information

Made by **Anderson Bros. Mfg. Co.**
1828 Kishwaukee St. Rockford, Ill.



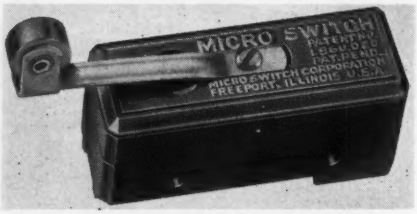
FOR ACCURATE JIG WORK
rely on
UNIVERSAL
DRILL BUSHINGS

Because of their super-finished bore, Universal Drill Bushings are exceptionally straight and round. Super-finishing, together with their combined nitrogen and carbon case, provides unusually long wearing qualities. Their black rust-proof dome adds to the appearance of your tools.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.

bearing. The roller has a diameter of ⅜ in., and is held to a true roundness within 0.002 inch.

The Roller Leaf Spring-Actuated Micro Switch is 2½ in. long, 1⅜ in. high, ¾ in. wide, and handles ½ h.p. It is of single pole construction and can be obtained with normally open, normally closed, or double throw contact arrangements. Either the Standard or Type Z Micro Switch can be supplied with the roller leaf actuator. All switches are available in metal-clad housings.



Roller Leaf Spring-Actuated Micro Switch

H. O. Bates Name Plate Stamping Machine

The name plate stamping machine with improved table adjustment, automatic advance, and clamping bar now being built by H. O. Bates, 251-257 N. Broad St., Elizabeth, N. J., is said to have more than doubled the marking speed formerly obtained with this machine. The unit is sturdily constructed with screw pressure and screw feed, and is equipped with a ball bearing spring clutch. All parts of the unit are made of steel and hardened in places where wear is apt to occur. A heavy, deep threaded pressure screw with thrust bearing pressure mounting is provided.

The double slide table is of ⅛-in. steel and is ample in size to take name plates up to 5 x 8 in. in size. It has a full ⅜-in. up-and-down thickness adjustment controlled by the pressure handle. The table is also provided with a line spacing guide on the side, along with a steel clamping bar for large name plates or special pieces. There is an automatic advance of 4½ in. In addition, the unit is equipped with a hardened, ample length indexing pin with spring pressure. Wear and loosening from hard usage are

YOU CAN'T AFFORD TO OVERLOOK A
700% Weekly Profit
WHEN MACHINING STEEL

Here is a typical saving made possible by using KENNAMETAL-tipped tools in machining Nickel-Chromium gear blanks:

50% less "floor to floor" time, or 4 hours per day
Cost of labor plus overhead=$2.00 per hour
Savings per day=4 (hours) x $2.00=$8.00
Savings per week=5½ (days) x $8.00=$44.00
Cost of No. 11 tool (in lots of 5 to 9)=$6.34
Profit per tool per week=approximately 700%

Since KENNAMETAL will machine steel up to 500 Brinell, you may expect additional profits through savings in annealing charges, and the accurate finish it provides will save you many dollars in grinding costs. Catalog No. 2 explains how to torch braze your own tools using KENNAMETAL blanks. Write for your copy without delay.

McKENNA METALS Co
800 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

STEEL STAMPS AND STEEL DIES
For Hand and Press Stamping

More than 45 years experience producing dies for stamping on Steel, Brass, Celluloid and other materials. *Prompt Service, Fair Prices.* Established 1892.
M. McNamara Stamp & Stencil Works, Inc.
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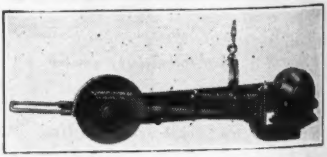
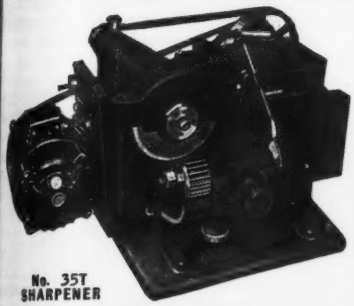
NEW YORK CITY
Phone STuyvesant 9-4405

MUMMERT-DIXON SWING FRAME GRINDERS



Sizes 14", 16", 18", 20" and 24" wheels.
ASK FOR DESCRIPTIVE CIRCULAR
MUMMERT-DIXON CO.
120 Philadelphia St. • Hanover, Pa.



No. 35T SHARPENER

AUTOMATICALLY SHARPENS METAL SAWS IN GANGS

Up to 5½" diameter and up to 1¼" thickness. 100 SAWS of 26 GAUGE CAN BE SHARPENED AT ONE TIME.

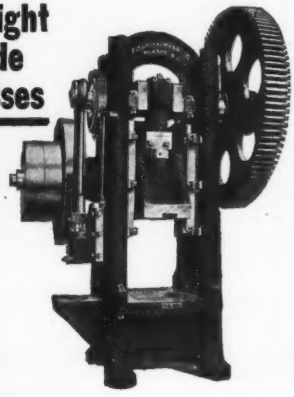
The saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR

THE WARDWELL MFG. CO.

2168 Fulton Rd. Cleveland, O.

Straight Side Presses



Outstanding in every detail for heavy blanking and forming work. All stresses are taken centrally.

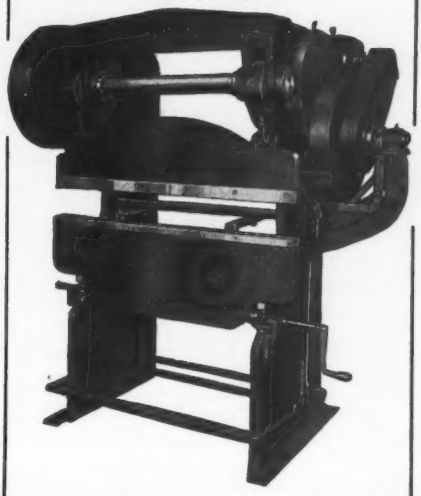
Write for new catalog illustrating and describing this and other presses.

Zeh & Hahnemann Co.

184 Vanderpool St. Newark, N. J.

CHICAGO STEEL PRESS

No. 253



does 40% to 60% of the forming work turned out by the average shop.

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

Sizes 4, 5 and 6 ft. capacities up to 10 gauge.

Write for Circular No. 253

DREIS & KRUMP MFG. Company

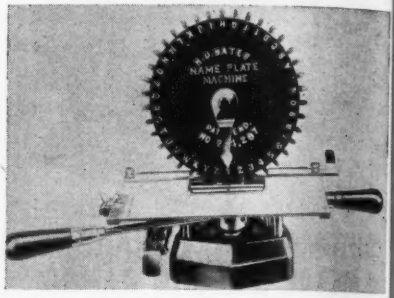
7418 LOOMIS BLVD.

CHICAGO ILLINOIS

prevented by means of spring pressure against the wheel of the wheel shaft.

The machine is furnished with dies assembled in sizes from 1/8 to 5/8 in. Extra wheels assembled with dies, which are quickly interchangeable, can be supplied from stock. Standard true-center machine engraved hand-cut dies and dies of special tough steel to withstand stamping of untempered metals, including steel and steel alloys, are also available.

Materials stamped with the machine include stainless steel, steel, chromium plated steel or brass, copper, bronze, fibre, bakelite, celluloid, wood, and many other materials. Height of the unit is 10¾ in.; distance, front to back, 8 in.; left to right dimension exclusive of operating handles, 10¼ in.; throat depth, 3 in.; approximate weight packed for shipping, 34 pounds.



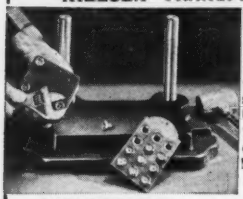
H. O. Bates Name Plate Stamping Machine

Time Totalizer

An instrument for automatically measuring the "on time" of alternating current circuits is announced by the Production Instrument Company, 702-12 W. Jackson Blvd., Chicago, Ill. The Time Totalizer, as this instrument is called, consists of a number wheels geared to a synchronous motor so that they record time in hours and tenths of hours. When connected in parallel with a motor, radio, X-ray or Diathermy apparatus, lighting circuit or other alternating current circuit, the instrument automatically accumulates the total "on time."

In the operation of printing presses, textile machinery, machine tools and other production equipment, the Time

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods.

7 Sizes U. S. S.—Inexpensive — Last for years.

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NIELSEN TOOL & DIE COMPANY
1863 Gardner Ave. Berkley, Mich.

New Nesting Type Tote Pans

Lots of 50 $1.00 each

20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

Lots of 100 & 200 less 3%; 300 up less 5%

J. L. LUCAS & SON, INC.
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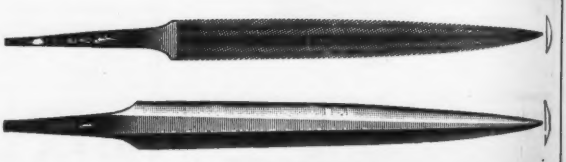


TRADE MARK

Over 4,000 Shapes, Cuts and Sizes
American and Swiss Patterns

CARSON-NEWTON CO.
61-71 MILL ST. • BELLVILLE, N. J.

Totalizer registers actual working time and thus facilitates the computation of idle time. It affords valuable data for figuring costs and planning production,

Time Totalizer

as well as a gage for figuring income-producing value of the machine. Time totalizing also permits maintenance and renewal of rapidly wearing parts, as well as grinding of tools, and so on, on the basis of actual service.

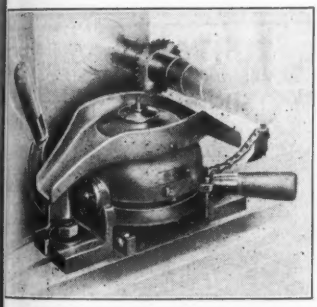
The Time Totalizer is ruggedly built and enclosed in a dustproof case with adequate provision for mounting and convenient wiring.

Starrett No. 436 Stain-Resisting Micrometer

To meet the demand for micrometers protected against rust and stain and for micrometers with wear-resistant anvil and spindle tips for use where abrasive conditions exist, The L. S. Starrett Co., Athol, Mass., has announced several additions to their line.

Shown in the illustration is the Starrett Micrometer No. 436, a black enameled frame micrometer caliper, now available with the sleeve and thimble on which the graduations and the table of decimal equivalents appear made of stainless steel. This model is made in a complete range of sizes from 0 to 24 in. and can be graduated to read in English or metric measure.

Other additions to the line include micrometers that are made stain resisting and longer wearing by chromium plating, and micrometers with Carboloy-faced anvils and spindles or with Nor-

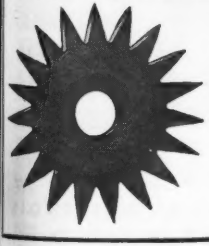


Mill Over 1,000 Parts Per Hour
WITH THE
NEW Dearborn Automatic Chucking and Indexing Fixture

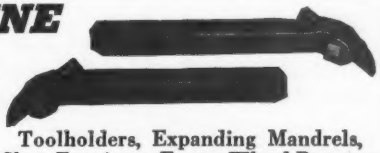
Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN
70 S. CLIFF ST. ANSONIA, CONN.

THE CHAMPION LINE

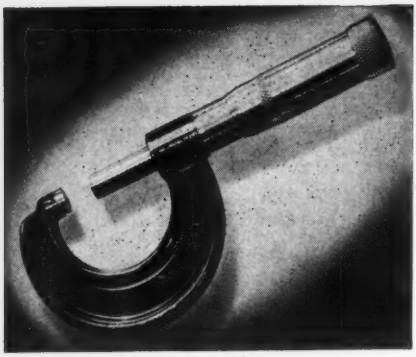


Leaders in quality and design—winners on merit and performance.



Toolholders, Expanding Mandrels, Shop Furniture, Emery Wheel Dressers and Cutters, Etc., Etc.
Write for Catalog

The Western Tool & Manufacturing Co. Springfield OHIO



Starrett No. 436 Stain-Resisting Micrometer

bide inserts for use under severe abrasive conditions.

Dixon's XP-320 Graphite Coating

A rust preventative and lubricating material, to be known as Dixon's XP-320 Graphite Coating, has been placed on the market by Scully Steel Produc Company, 1319 Wabansia Ave., Chica Ill. In consistency it is similar to thin paint.

The primary purpose of the coating to prevent rusting. Tests on steel the open are said to show no signs rust after two years. Accelerated la oratory tests indicate that it will r sist rust in the Chicago climate ou doors on steel from five to seven yea

One feature of Dixon's XP-320 Grap ite Coating is its ability to dry rapid A thin film of the coating is spread the object to be protected with a brus It drys to touch in approximately 20 30 minutes and does not allow rust dirt to adhere to the surface. Proper used, one gallon will cover 375 to 4 square feet.

The manufacturer claims that it advisable to leave XP-320 on machi parts before assembling them. On pre or force fits it has been found tha with the same tolerance, less pressu is required to assemble parts whic have been coated with XP-320. The coa ing also acts as a lubricant when ma chinery is started.

While XP-320 is not offered as a acid-resisting coating, it is claimed tha it has been found very efficient in th

PYRO THE SIMPLIFIED OPTICAL PYROMETER

Unique construction enables operator to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO.
Write for Bulletin No. 80 101-105 Lafayette St., N. Y.

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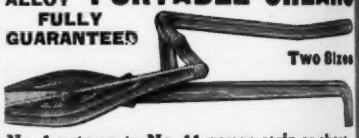
FULLY GUARANTEED



Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.
Special Blades for shearing stainless steel.

BREMIL MFG. CO.
1725 PITTSBURGH AVE. ERIE, PA.

HINGES
VARIOUS WIDTHS and GAUGES

BUTTS AND CONTINUOUS LENGTHS
WRITE FOR PRICES

For GUARDS CABINETS CASES BOXES

S & S MACHINE WORKS
4541 W. LAKE STREET HARDWARE DIVISION CHICAGO, ILLINOIS

ACME
Standardized
JIG BUSHINGS

Acme Standard
over 6700 Items
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over 4200 Items

Acme Drill Jig Bushings are made by the most exacting, scientific methods — insuring long wear, accurate fit, and absolute satisfaction. A standardized product, carried in stock for prompt delivery in over 10,900 standard items— all completely finished and ready for use. Special sizes made to order.

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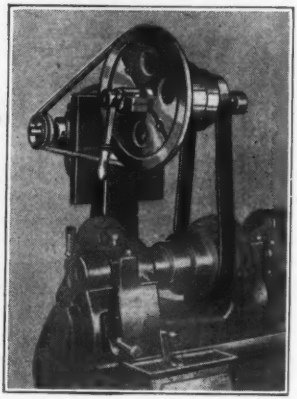
GUARANTEED
FOR 5 YEARS

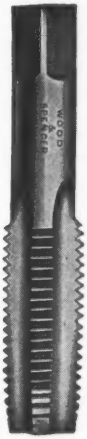


When you purchase a STEEGE Drive for your lathe, shaper, miller, etc., you are protected by our broad 5-yr. guarantee.

STEEGE Drives are easily installed — prices $35.00 up—sent on 30 days' approval. *Let us send catalog.*

W. L. STEEGE MACHINERY CO.
(Our 23rd Year)
550 W. MONROE ST., CHICAGO, ILL.

WOOD & SPENCER



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STANDARD and SPECIAL

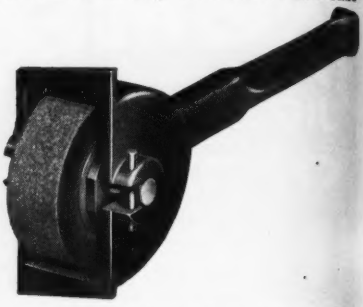
QUICK DELIVERY

The Wood & Spencer Co.
1910 E. 61st St.
CLEVELAND, OHIO

respect. The coating has also been used as a priming coat, although it will not accept all paints.

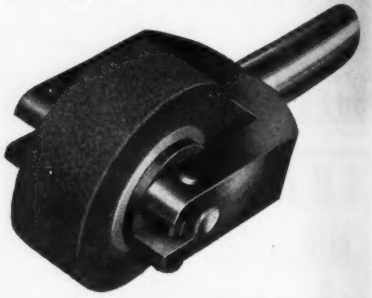
Desmond "Crackerjack" Grinding Wheel Dressers

A single handle type and a tool post type of grinding wheel dresser have been added to the line of "Crackerjack" grinding wheel dressers manufactured by The Desmond-Stephan Mfg. Co., Urbana, Ohio. The dressers are said to true up square edges, and turn bevels or vee edges without breaking or chipping the wheel. Grinding wheels that have been filled up with metal are easily dressed and given a fast grinding surface by the use of either type of dresser.



Desmond Single Handle Type "Crackerjack" Grinding Wheel Dresser

The action of the Desmond "Crackerjack" Grinding Wheel Dresser is due to the cutting effect of one abrasive wheel on another when their axes are at angle of from 20 to 35 degrees.



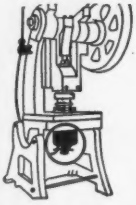
Desmond Tool Post Type "Crackerjack" Grinding Wheel Dresser

GRAY TURRET HEAD METAL CUTTER OR NIBBLER

Cuts all metals any shape—30 gauge up to 1".

GRAY, Originator of First Practical Metal Cutter or Nibbler. GRAY Cutters Still Lead.

GRAY MACHINE CO.
Dept. A., P. O. Box 596, Philadelphia, Pa.



Universal Die Cushions for deep drawing, forming die, pressure pad control, and blanking die stripper actions.

Write for engineering power press die booklet.

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MINNEAPOLIS • MINNESOTA

HEAVY AUTOM DUTY

Continuous Hinge No. 290

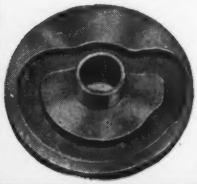
A Heavy Hinge For Heavy Duty
Stocked in 7 foot lengths, 3" and 5" when wide open.
Special lengths and widths to order.
For details write:
Auto Moulding & Mfg. Co.
HINGE DIV.
2326 S. Canal St.
CHICAGO

CAMS

All sizes—shapes

...

Precision work on special machines, parts, jigs, tools, etc.



VARICK MACHINE & TOOL WORKS, INC.

106 HUDSON ST. • NEW YORK

TRICO REG. U.S. PAT. OFF. **AUTOMATIC OILERS**

SAVE TIME—OIL—WORRY

OPTOMATICS and **LEVOMATICS** maintain a constant level of oil in ring and ball bearings.

The **DRIP-DROP** is a thermal oiler dropping oil on the bearing from the top exactly as needed.

TRICO FUSE MFG. CO. MILWAUKEE, WIS., U. S. A.

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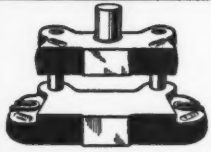
BAUMBACH



STANDARDIZED DIE SETS

Machine Steel | Semi-Steel

DROP FORGED STEEL

Standardized Die Sets, embodying many exclusive features, a listing of more than 185,000 stock sizes and 46 different styles afford a service that is unsurpassed.

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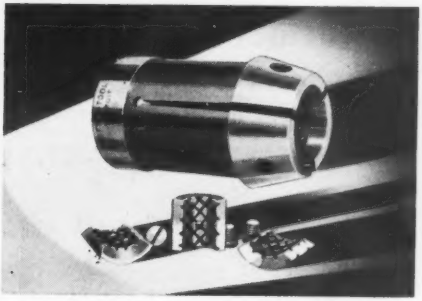
1806 S. Kilbourne Ave. Chicago, Ill.

Spotlighted By Long Life



DIAMOND - GRIP Master Collets with diamond-serrated Pads

◈◈ Specially selected spring steel is used in making the Sutton DIAMOND-GRIP Master Collet. It is given a spring-temper treatment to insure long-lasting tension for gripping the pads. Pads are made from special alloy steel expertly heat-treated to insure toughness and wear-resistance. . . . And on the job DIAMOND-GRIP Collets work with less wear on the chucking mechanism and the collets. The deep, clean-cut diamond serrations grip tighter under less tension.

◈◈ Complete listings of all styles of Sutton DIAMOND-GRIP Collets for all screw machines in Cataog 12. Send for a copy.

Sutton Tool Company

2842 W. Grand Blvd., Detroit, Mich.

Represented in Canada by HI-SPEED TOOLS, Ltd., Galt, Ont.

Accessories for Screw Machines

The single handled dresser is designed for use on any tool rest or stand, while the tool post type dresser is made for use in a holder or tool post, and can be furnished with any size shank. Each type of dresser is equipped with a double row of dust protected ball bearings, and uses a full size 4-in. diameter abrasive wheel of special grade and grain.

Willey's Sizing Gages

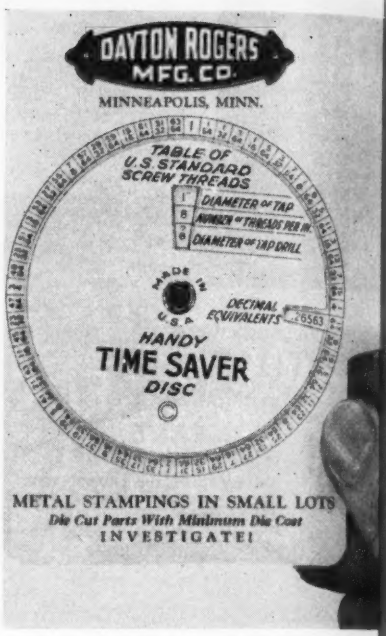
Sizing gages, tipped with a patented wear metal which is said to multiply the life of the gage many times, are

Willey's Sizing Gage

now being marketed by Willey's Carbide Tool Company, 1340 W. Vernor Highway, Detroit, Mich. The gage, illustrated herewith, is available in diameters from 0.365 to 4.010 in. and can be furnished in tolerances from 0.00004 to 0.00010 inch.

Handy Time Saver Disc

The Dayton Rogers Manufacturing Company, 2830 South 13th Ave., Minneapolis, Minn., has announced for free



Handy Time Saver Disc

distribution a handy time saver disc giving the correct size of tap drills for the U. S. gage screw threads, together with a decimal equivalent chart. On the reverse side of the disc are listed the tap drill sizes of National coarse machine screws and National fine machine screws, together with a complete listing of tap drill sizes for the National pipe thread standards.

This time saver disc is printed on a grease and oil-resisting material primarily designed for shop use.

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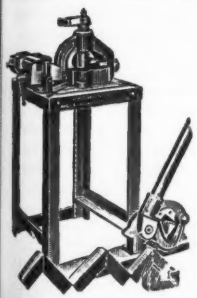

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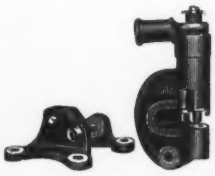


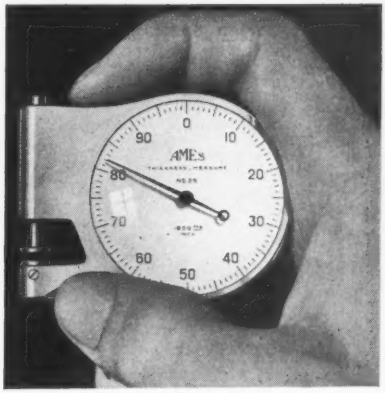
Whitney Metal Tool Co.

110 FORBES ST. ROCKFORD, ILL.

AMES

THICKNESS MEASURE

No. 25



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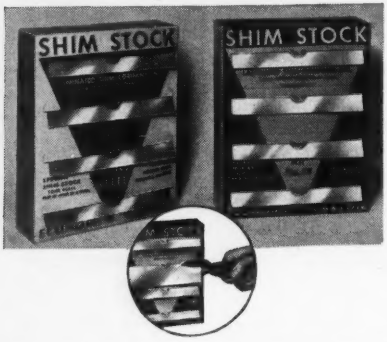
Temperature Chart

A temperature color chart presenting a continuous shading of color from faint red to white and listing the temperatures for all the various shadings will be sent to each person who addresses a request to Crucible Steel Company of America, 405 Lexington Ave., New York, New York.

Laminated Shim "Economy" Carton for Thin Shim Stock

The efficiency of the Laminated Shim "Economy" Carton containing a handy assortment of the most frequently used thicknesses of thin brass shim stock has resulted in a demand for thin steel



Laminated Shim "Economy" Kit No. 88-S

shim stock in a similarly convenient assortment and container. To meet this demand, the Laminated Shim Co., 21-44 44th Ave., Long Island City, N. Y., is now manufacturing the "Economy" Kit No. 88-S, containing four 6 x 50-in. rolls of precision steel shim stock in thicknesses of 0.001, 0.002, 0.003, and 0.005 in. The carton stands on a self-easel, but may be hung on the wall if desired. Shim stock of any roll is simply pulled through a slot in the carton and cut off as needed, thereby avoiding waste, wrinkling, or damage in handling, and effecting considerable time-saving.

The Laminated Shim Co. also announces that its regular line of 6 x 100-in. brass or steel shim stock rolls, each packed in a slotted carton, has been enlarged. Thicknesses of the brass shim stock in this size now range from 0.001 to 0.010 in. and, in addition, include 0.012 and 0.015 in. The 0.0015, 0.004, 0.006, 0.007, and 0.009-in. thicknesses are also included. In steel, the thicknesses have been extended to include not only the 0.001 in., but also a complete range through 0.010-in. thicknesses of 0.012 and 0.015-in. have also been added.

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Correction

In the description of the 5 x 30-in. J&L Automatic Thread Grinder which appeared in the March issue of this magazine, the statement was made that the machine will grind right hand threads up to a helix angle of 35 deg. and left hand threads to 30 deg. This is not correct. The machine grinds right hand threads with a maximum helix angle of 25 deg. and left hand threads with a maximum helix angle of 30 degrees.

"Standard" Universal Surface Gage and Comparator, which is said to give quick and accurate results at all times, is featured in a bulletin published by Standard Gage Company, Inc., Poughkeepsie, N. Y. Copy free.

Arc Welding and How To Use It. Third Edition. 340 pages, 320 illustrations. Bound in semi-flexible imitation leather. Published by Hobart Brothers Company, Troy, Ohio. Price, $1.50.

This arc welding manual written in plain, understandable, non-technical English is divided into six logically arranged sections, as follows: Part I, General Information; Part II, Practical Welding Lessons; Part III, Carbon Arc Welding; Part IV, Instructions on Other Metals; Part V, Special Information, and Part VI, Modern Welding Equipment. Twenty-five useful tables of valuable data for operators and designers are included. The book is especially recommended by the publisher as a textbook for both beginning and advanced welding classes.

Monarch "Flame Hardening" Motion Picture Film

Of interest to production executives is the fact that The Monarch Machine Tool Co., Sidney, Ohio, has completed the development of a 16 mm. colored motion picture film, which shows the procedure by which Monarch lathe beds are "Flame Hardened." This film is 100 ft. in length.

The motion picture illustrates how the Monarch "Flame Hardening" process permanently solves the problem of bed wear. One of the scenes shows a 24-in. Monarch lathe bed being hardened to a depth of ⅛ in., as specially-designed "Flame Hardening" tips travel slowly over the "V" and "flat way" sections. Another scene shows how the way surfaces are hardened after finish planing, and then ground to a tolerance of 0.005 in. on large precision surface grinders.

A close-up view of a section of the "Flame Hardened" bed shows that it has the appearance of hardened steel. The metal directly under the hardened sections is dense and close grained giving solid, rigid support to the sections.

Another scene from the film emphasizes the fact that the "Flame Hardened" beds are said never to crack, flake or loosen from the supporting sections of the bed castings, even when they are subjected to severe hammer blows.

Standard lantern slides showing the "Flame Hardening" process are also available. The "Flame Hardening" motion picture film as well as the lantern slides will be loaned, without obligation, to technical societies, industrial groups or other organizations which may find this Monarch development of interest.

Hartford "Super-Spacer." In this four-page folder, now being issued by The Hartford Special Machinery Co., Hartford, Conn., the manufacturer outlines the uses and advantages of the Hartford Super-Spacer—a spacing device for the rigid control of accurate machining operations within its scope. Copy free upon request.

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FOR YOUR CATALOG LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. **Duo Magnetic Chuck**
The Kar Duo Magnetic Chuck is detailed in a new circular released by The Kar Engineering Co., Inc., 200 Hudson St., New York, N. Y.

2. **Oil-Hardening Tool Steel**
Ketos Oil-Hardening Tool Steel is detailed in a bulletin issued by Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.

3. **Automatic Punching & Riveting Machines**
Engineering & Research Corporation, Washington, D. C., has issued a new 18-page catalog featuring the Erco line of automatic punching and riveting machines.

4. **Die Feed**
Folder No. 82 gives the complete story of the Dickerman Die Feed. H. E. Dickerman Mfg. Co., 282 Wilbraham Road, Springfield, Mass.

5. **Knurls**
Reed Standard Stock Knurls are illustrated and cataloged in a new circular issued by Reed Small Tool Works, Worcester, Mass.

6. **Lathes**
The Sidney Machine Tool Co., Sidney, Ohio, has just released an attractive catalog featuring the Sidney 16-speed herringbone geared lathes.

7. **Machine Handles**
Catalog and price list covering machine handles is available from The Cincinnati Ball Crank Co., Cincinnati, Ohio.

8. **Broaches**
"Problems Solved by Broaching" is the title of an interesting bulletin just released by Continental Tool Works Division, Ex-Cell-O Corporation, Detroit, Michigan.

9. **Chucks**
The Jacobs Manufacturing Co., Hartford, Conn., has issued Catalog No. 39, illustrating and describing as well as listing prices on all Jacobs Chucks.

10. **Turret Lathes**
J & L Saddle Type Single Lever Control Universal Turret Lathes are detailed in a new bulletin. Jones & Lamson Machine Co., Springfield, Vermont.

11. **Portable Grinder**
Details of the Onsrud B-1 75,000 R.P.M. 1/6 H.P. Grinder are outlined and illustrated in new bulletin. Onsrud Machine Works, Inc., 3916 Palmer St., Chicago, Illinois.

12. **Drill Grinder**
Oliver Instrument Co., 1430 E. Maumee St., Adrian, Mich., has bulletin available featuring the line of Oliver Drill Grinders.

13. **Hydraulic Feed Surface Grinders**
Catalog GL-100 illustrates and describes the line of Grand Rapids Hydraulic Feed Surface Grinders. Gallmeyer & Livingston Co., 308 Straight Ave., S. W., Grand Rapids, Michigan.

14. **Tap Extractor**
Folder 132 listing sizes and prices of Walton Tap Extractors is available from The Walton Co., 98 Allyn St., Hartford, Connecticut.

15. **Expansion Reamer**
Staples Tool & Engineering Co., Cincinnati, Ohio, has issued a new folder which illustrates and describes the Staples Carboloy tipped expansion reamer.

16. **Tapping Hints**
"Nevers for Tapping" is the title of an attractive, cleverly presented booklet giving valuable information for tap users. John Bath & Co., Worcester, Massachusetts.

17. **Needle Point Diamonds**
F. F. Gilmore & Co., 112 Dartmouth St., Boston, Mass., has issued a new folder detailing Gilmore Needle Point Diamonds for truing fine grained or sharp edge grinding wheels.

18. **Drill Chucks**
Folder 100, released by Scully-Jones & Co., 1913 S. Rockwell St., Chicago, Ill., illustrates, describes and lists prices on "Feed as you need" Chucks.

19. **Demagnetizers**
Walker A.C. and D.C. Demagnetizers are detailed in circular K7. O. S. Walker Co., Inc., Worcester, Massachusetts.

20. **Bronze Bearings, Seals, etc.**
"The Jewel of Metals" is the title of a booklet issued by the Frederickson Company, Saginaw, Mich., which features Sabeco Bronze bearing metal.

21. **Multi-Miller**
The New U. S. Multi-Miller for high-speed production on small parts is illustrated and described in new bulletin MM-2. U. S. Tool Company, Inc., Ampere, East Orange, New Jersey.

22. **Rotary Positive Air Pumps**
Leiman Bros., Inc., 3W-23 Walker St., New York, N. Y., has available a 32-page booklet describing and illustrating applications of Leiman Rotary Positive Air Pumps.

23. **Tool Steel Guide**
Bethlehem Steel Co., Bethlehem, Pa., has issued a 36-page booklet outlining the entire range of tool steels and their fields of use, plus a systematic method for selecting the right steel for the purpose.

24. **Motors**
Various type motors, gear-motors, brake motors, and motor generator sets are illustrated in Bulletin No. 2 issued by Star Electric Motor Co., Bloomfield, New Jersey.

25. **Drill Press Vises**
The Graham Mfg. Co., 69 Willard Ave., Providence, R. I., has available circulars illustrating and describing vises.

26. **Tool Steel Selector Table**
A handy tool steel selector table is available from A. Milne & Co., 741 Washington St., New York, N. Y.

Print plainly in filling out coupon for literature.

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N. Y.

Scherr General Catalog. The George Scherr Company, 130 Lafayette St., New York, N. Y., has published a general catalog showing the complete line of machine tools, instruments, and machinery handled by this organization. The catalog includes mechanics' tools such as vernier calipers, height gages, micrometers, and plug gages; optical inspection tools such as toolmakers' shop measuring, binocular, comparison, and metallurgical microscopes, comparators and projectors. Also described are gear testing equipment, gear hobbers, gear grinders, thread and worm millers, reversing lathes, saw sharpeners, machinery for instrument making such as automatic turning lathes, pivot burnishing machines, opticians' turret lathes, jig borers; hand tachometers, speed indicators, and lathe chucks.

Included also are several items that are being shown in the United States for the first time. Outstanding among these is a Bore Inspection Telescope for inspecting interior surfaces of tubes, pipes, forgings, cans, barrels, hollow sections of airplanes, and other articles, in order to reveal any defects, wear, rust or imperfections. This is an important inspection tool for safety and preventive measures. Copy free to shop executives upon request.

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Burt Wesser

Sheaves. A four-page leaflet on 2-3-4 adjustable single groove combination sheaves has just been released by the Texrope Division of the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. The leaflet, No. 2333, which will be sent on request, gives sectional views of the new combination sheaves, showing how the outer sheave plate can be reversed for greater speed range without removing the sheave from its shaft.

Instructions for Heat Treating Carbon Tool Steels are contained in a four-page folder now being issued by A. Milne & Co., 741 Washington St., New York, N. Y. The folder contains general instructions for forging, annealing, hardening, quenching and drawing, and presents a table showing the range of temperatures at which these various treating operations should be performed. Copy free upon request.

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HOWARD CAMPBELL, Editor

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